PROGRESSIVE
MEDICINE

610.5 P94

DOMINA RERUM SAPIENTIA

Library
of the
Academy of Medicine,
Toronto.
928

Presented by

Dr. John Ferguson.

Digitized by the Internet Archive
in 2008 with funding from
Microsoft Corporation

http://www.archive.org/details/progressivemedic01philuoft

CONTRIBUTORS TO VOLUME I.

BLACKADER, ALEXANDER D., M.D.
DA COSTA, J. CHALMERS, M.D.
HEKTOEN, LUDVIG, M.D.
PACKARD, FREDERICK A., M.D.
RANDOLPH, ROBERT L., M.D.
TURNER, A. LOGAN, M.D. (EDIN.), F.R.C.S.

PROGRESSIVE MEDICINE.

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES, AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES.

EDITED BY

HOBART AMORY HARE, M.D.,

PROFESSOR OF THERAPEUTICS AND MATERIA MEDICA IN THE JEFFERSON MEDICAL COLLEGE OF PHILADELPHIA; PHYSICIAN TO THE JEFFERSON MEDICAL COLLEGE HOSPITAL; LAUREATE OF THE ROYAL ACADEMY OF MEDICINE IN BELGIUM, OF THE MEDICAL SOCIETY OF LONDON; CORRESPONDING FELLOW OF THE SOCIEDAD ESPAÑOLA DE HIGIENE OF MADRID; MEMBER OF THE ASSOCIATION OF AMERICAN PHYSICIANS, ETC.

ASSISTED BY

CHARLES ADAMS HOLDER, M.D.,

ASSISTANT DEMONSTRATOR OF THERAPEUTICS IN THE JEFFERSON MEDICAL COLLEGE.

VOLUME I. MARCH, 1900.

SURGERY OF THE HEAD, NECK, AND CHEST—INFECTIOUS DISEASES, INCLUDING ACUTE RHEUMATISM, CROUPOUS PNEUMONIA AND INFLUENZA—DISEASES OF CHILDREN—PATHOLOGY—LARYNGOLOGY AND RHINOLOGY—OTOLOGY.

LIBRARY
OCT 23 2001
UNIVERSITY OF TORONTO

LEA BROTHERS & CO.,
PHILADELPHIA AND NEW YORK.
1900.

928.

Entered according to the Act of Congress, in the year 1900, by
LEA BROTHERS & CO.,
In the Office of the Librarian of Congress. All rights reserved.

DORNAN, PRINTER.

PREFACE BY EDITOR.

When the first volume of Progressive Medicine for 1899 appeared, a year ago, I outlined in its preface the object for which this publication was instituted, and I can do nothing better at the present time than repeat those words. That some authoritative summary of current medical literature presented in narrative form was needed by a large number of the profession is proved by the success of the publication during the first twelve months of its existence, and a still more intimate acquaintance with medical literature has convinced me that even if one has brought to him weekly the best medical literature of the world it is impossible to keep up with it in the sense of grasping its details and assimilating its really valuable practical facts in such a way that they can be applied at the bedside.

Original researches, disputations, records of epoch-making cases or discoveries come to one so fast and so voluminously that a life's work could be found by the physician who attempted to study all the views presented to him. The state of the progressive medical man of to-day is that of a man who, while hungry for food, has thrust upon him such a mass of pabulum prepared in so many forms by so many cooks that it is possible for him to get but a taste of many dishes from which he might obtain much pleasure and strength if he but knew their real value and design. Often the technical appearance of an article staggers his mental digestion, and he casts it from him as being too difficult a morsel for him to assimilate.

There are at the present time numerous "Annuals" or "Year-books" published with the object of recording in condensed form the greater part of the medical literature of the year, but in nearly all of them the process of "boiling down" has been practised without first sifting the useful from the useless, with the result that the physician has presented to him a mass, concentrated, it is true, but so varying in quality that the good can only be separated from the bad by a process as difficult as that needed for the utilization of the crude material. What the busy physi-

928

cian needs to-day is a well-told tale of medical progress in all its lines of thought, told in each line by one well qualified to cull only that matter worthy of his attention and necessary to his success. He needs an article which can tell him all that the master of his specialty knows of the year's work, and he does *not* need an immense quantity of material which, however interesting it may be from its novelty, possesses no intrinsic merit.

It is with the object of presenting such readable and useful material that these volumes are published, and every contributor to the pages of PROGRESSIVE MEDICINE has been asked to say what he has to say in a narrative form, and, equally important, to place his hall-mark on the text, so that it will be a story which bears a personal imprint and will express not only the views of the authors cited, but the opinion of the contributor as well. The volumes are personal narratives of medical advance, and this characteristic greatly increases their interest and value.

H. A. H.

LIST OF CONTRIBUTORS.

HENRY B. BAKER, M.D.,
Michigan State Board of Health, Lansing, Mich.

WILLIAM T. BELFIELD, M.D.,
Associate Professor of Surgery in the Rush Medical College; Professor of Surgery in the Chicago Polyclinic, Chicago.

ALEXANDER D. BLACKADER, M.D.,
Professor of Pharmacology and Therapeutics and Lecturer on Diseases of Children in the McGill University, Montreal, Canada.

JOSEPH C. BLOODGOOD, M.D.,
Associate in Surgery in the Johns Hopkins University; Assistant Surgeon to the Johns Hopkins Hospital, Baltimore, Md.

JOHN ROSE BRADFORD, M.D., F.R.C.P.,
Professor of Materia Medica and Therapeutics in the University College, London, and Professor-Superintendent of the Brown Institution.

ALBERT P. BRUBAKER, M.D.,
Adjunct Professor of Physiology and Hygiene in the Jefferson Medical College, Philadelphia.

JOHN G. CLARK, M.D.,
Professor of Gynecology in the University of Pennsylvania, Philadelphia.

WILLIAM B. COLEY, M.D.,
Clinical Lecturer on Surgery in the College of Physicians and Surgeons, New York, and Assistant Surgeon to the Hospital for the Ruptured and Crippled.

J. CHALMERS DA COSTA, M.D.,
Clinical Professor of Surgery in the Jefferson Medical College, Philadelphia.

MAX EINHORN, M.D.,
Professor in Medicine at the New York Post-Graduate Medical School and Visiting Physician at the German Dispensary of New York.

WILLIAM EWART, M.D., F.R.C.P.,
Physician to and Joint Lecturer on Medicine at St. George's Hospital and Physician to the Belgrave Hospital for Children, London.

FREDERIC H. GERRISH, M.D.,

Professor of Anatomy in the Medical School of Maine, Portland, Me.

LUDVIG HEKTOEN, M.D.,

Professor of Pathology in the Rush Medical College, Chicago.

EDWARD JACKSON, M.D.,

Emeritus Professor of Ophthalmology in the Philadelphia Polyclinic.

FREDERICK A. PACKARD, M.D.,

Instructor in Clinical Medicine in the University of Pennsylvania, Visiting Physician to the Philadelphia and Children's Hospitals, and to the Outpatient Department of the Pennsylvania Hospital.

RICHARD C. NORRIS, M.D.,

Instructor in Obstetrics in the University of Pennsylvania, Philadelphia; Physician-in-charge of Preston Retreat.

ROBERT L. RANDOLPH, M.D.,

Associate in Ophthalmology and Otology in the Johns Hopkins University, Baltimore, Md.

WILLIAM G. SPILLER, M.D.,

Professor of Diseases of the Nervous System in the Philadelphia Polyclinic, Philadelphia.

HENRY W. STELWAGON, M.D.,

Clinical Professor of Diseases of the Skin in the Jefferson Medical College, Philadelphia.

ALFRED STENGEL, M.D.,

Professor of Clinical Medicine in the University of Pennsylvania, Philadelphia.

E. Q. THORNTON, M.D.,

Demonstrator of Therapeutics in the Jefferson Medical College, Philadelphia.

A. LOGAN TURNER, M.D. (EDIN.), F.R.C.S. EDINBURGH,

Surgeon for Diseases of the Ear and Throat to the Deaconess Hospital; Assistant to the Lecturer on Laryngology in the University of Edinburgh.

CONTENTS OF VOLUME I.

PAGE

THE SURGERY OF THE HEAD, NECK, AND CHEST 17

By J. CHALMERS DA COSTA, M.D.

INFECTIOUS DISEASES, INCLUDING ACUTE RHEUMATISM, CROUPOUS PNEUMONIA, AND INFLUENZA 133

By FREDERICK A. PACKARD, M.D.

THE DISEASES OF CHILDREN 225

By ALEXANDER D. BLACKADER, M.D.

PATHOLOGY 277

By LUDVIG HEKTOEN, M.D.

LARYNGOLOGY AND RHINOLOGY 345

By A. LOGAN TURNER, M.D. (Edin.), F.R.C.S. Edin.

OTOLOGY 385

By ROBERT L. RANDOLPH, M.D.

INDEX 415

PROGRESSIVE MEDICINE.

MARCH, 1900.

SURGERY OF THE HEAD, NECK, AND CHEST.

By J. CHALMERS Da COSTA, M.D.

THYROID GLAND.

Exophthalmic Goitre. TREATMENT. Exophthalmic goitre is not always a surgical disease. Operation does not invariably cure, and is a dangerous necessity which should be rarely advised and should only be employed to meet particular conditions. Medical treatment is often of great value. There is nothing more important in a severe case than rest in bed, and ice should be applied from time to time to the neck and over the heart. Belladonna is a useful drug, for it checks secretion, and many facts seem to indicate that in exophthalmic goitre there is always excessive and often altered secretion of the thyroid gland. Digitalis or strophanthus in advancing doses often does much good. Some cases are helped by suprarenal extract, some few by dried thymus. The administration of thyroid extract in Graves' disease almost always makes the patient worse, a result to be inferred from the observation that healthy animals fed on thyroid develop many of the symptoms of exophthalmic goitre, and also from the known fact that the administration of thyroid extract in the treatment of obesity has occasionally produced what appears to be exophthalmic goitre. Some doubt is thrown upon the above theory of causation by the fact that Graves' disease can exist without apparent enlargement of the thyroid, may occasionally continue in spite of thyroidectomy, and may from the start present unilateral symptoms which it is hard to believe could be due to a general intoxication. Such apparently contradictory observations should make us conservative in advising an operation. The operative reports can be regarded as favorable, although death not very rarely occurs, and may take place with great suddenness. In estimating the value of an operation we are always to remember that exophthalmic goitre may be cured by rest or by medical treatment, and in rare cases may disappear spontaneously or after a nervous shock or after an operation performed for some other purpose on a distant part.

In PROGRESSIVE MEDICINE for 1899, Vol. I., I made the following suggestions: If medical treatment fails and the symptoms are urgent, consider the advisability of partial thyroidectomy unless the goitre is very large or extremely small, or the patient is very hysterical. Removal of a very large goitre is extremely dangerous, and will not bring about cure. If the thyroid gland is but little enlarged it is not necessary to remove it. In severe hysteria operation is often useless. Never promise a cure, and always set forth the danger of the operation.

Pitres[1] advocates the treatment of exophthalmic goitre by the INJECTION OF IODOFORM AND ETHER. He formerly used tincture of iodine, but abandoned it because abscesses are apt to ensue upon its injection. The material he now employs is a 10 per cent. solution of iodoform in ether, 1 c.c. being injected into the goitre every eighth day. The injection causes considerable pain for a few minutes, but produces no bad result. Pitres has successfully treated twelve cases by this plan, and six of the cases have remained well for more than two years. Under this treatment he tells us the gland shrinks, the insomnia, exophthalmos and nervous symptoms pass away, and finally the cardiac irritability disappears. It would seem that the glandular elements must be finally destroyed by the formation of fibrous tissue.

Some years ago Professor Gersuny, of Tübingen, advocated the treatment of ordinary goitre by the injection of iodoform (one part of iodoform, seven parts of ether, and seven parts of sterile olive oil). He injects the goitre every fourth or fifth day, giving from three to sixteen injections to each case, and thus treated one hundred and fifty cases, of which 90 per cent. were greatly benefited. In such a procedure veins must be avoided; the surgeon may determine if the needle is in the thyroid by asking the patient to swallow, and noting whether the needle moves up and down with the gland.

Sir William Stokes[2] advocates the operation of PARTIAL THYROIDECTOMY in certain cases, and maintains that the results of operative treatment point "to the thyroid being the seat of the primary lesion." Stokes considers that we are justified in holding:

"1. That in a large proportion of cases shock is apparently the starting-point of the disease.

"2. That in one type or form of the disease the first tangible pathological deviation is enlargement of the thyroid.

---

[1] Lancet, August 19, 1899, Report of French Congress at Lille.

[2] British Medical Journal, October 29, 1898.

"3. That in such cases tachycardia, palpitation, and exophthalmos usually follow in this succession.

"4. That two distinct forms of the disease may be recognized, as pointed out by Charcot and Marie—namely, the complete and incomplete forms—and that for the purposes of prognosis and guide to treatment a distinction should be made between the cases commencing with tachycardia and those in which the thyroid enlargement precedes the palpitation.

"5. That only a very temporary benefit is, as a rule, derived from internal medication.

"6. That partial removal of the enlarged gland when it is primarily affected is likely to be followed by distinct improvement, and at times perfect recovery. This fact seems to strengthen the view of Kocher, that in the majority of cases, irrespective of Graves' disease, requiring thyroidectomy, total extirpation is not indicated. He has stated that in a very large proportion of his cases total removal was abandoned and only the partial operation performed."

The above paper of Stokes was read at the meeting of the British Medical Association. Professor Kocher[1] took part in the discussion, and maintained that operations on the thyroid are able to cure many patients with Graves' disease. In some cases the cure after operation is not perfect, and Kocher suggests that this partial failure may be due to the fact that enough of the gland has not been removed, or enough has not been made to atrophy by ligature, or it is possible that the real cause of the disease is localized behind the gland—that is, in the central nervous system.

If thyroidectomy is performed it must be partial. Complete thyroidectomy would probably cause myxœdema. A disturbing feature of goitre operations is the danger of sudden death during the procedure. This danger has been vastly lessened by the abandonment of ether and chloroform in such cases and the substitution of local anæsthesia by eucaine or cocaine.

Operations upon the Sympathetic still occupy a doubtful position. Their status is not determined. They find a few warm advocates, but as yet the number who have employed them is limited. There are two plans: that of Jaboulay, who divides the sympathetic nerves, and that of Jonnesco, who resects the cervical sympathetic ganglia on each side.

Jonnesco recently presented a paper on the subject of sympathectomy.[2] He has operated in this manner for essential epilepsy forty-five times, and for exophthalmic goitre ten times; in seven cases of glaucoma he has removed the superior cervical ganglia. In all, he has operated upon this nerve sixty-one times, and in forty-two of the operations he completely removed on each side the three ganglia and their fibres of junction. Of the ten cases of exophthalmic goitre, six were cured and four were improved. The exophthalmos and nervous symptoms disappeared rapidly, but the goitre often remained for months. Of exophthalmic goitre cases six were acute, and four of these were subjected to double bilateral resection; in two of them only the upper ganglion on each side was removed. In one case of exophthalmic goitre unilateral resection produced improvement.

---

[1] British Medical Journal, October 29, 1898.

[2] Centralblatt für Chirurgie, 1899, No. 6.

Jonnesco believes that resection produces sclerosis of the thyroid, and is enthusiastic about the operation. He says it produces no ill effects, and is most useful in primary Graves' disease; but very rapid cure is not always to be anticipated. He founds the operation upon the somewhat antiquated view that the disease is due to some irritation of the sympathetic system, and the operation relieves the heart from excessive urging on the part of the morbid sympathetic. The operation probably produces cerebral hyperæmia, and this antagonizes or prevents attacks of vascular constriction which are apt to arise in the course of exophthalmic goitre.

The operation is not free from danger, and I believe is founded upon an unsound hypothesis. Reports indicate that after the operation certain symptoms at least are apt to improve, but we will be loath to employ it until further facts are accumulated as to its real value and comparative safety.

Bronchocele, or Goitre. Many cases of goitre can be cured without operation (90 per cent., Kocher says), but operation is not to be urged simply to relieve the deformity of a non-malignant goitre which does not cause dyspnœa and which is not increasing in size. Cysts demand operation, as medical treatment fails to cure them and they increase progressively in size. If there is a suspicion of the case being malignant, or if there is dyspnœa, an operation is called for.

In a goitre which is irremovable and which threatens to produce suffocation, we can, according to Wölfler, raise it up from its bed without cutting or tearing its arteries and transplant it to an area where it will not cause so much obstruction. When this transplantation has been effected the goitre may diminish in size, and the tendency toward shrinking will be greater if the mass is seared with a thermo-cautery.

Dr. Jules Boekel[1] is an advocate of operation in many cases, and asserts that the mortality of thyroidectomy is under 4 per cent. The deaths which happen are usually due to hemorrhage or collapse of the trachea. In seventy-four operations there were twenty-five partial thyroidectomies, two complete thyroidectomies, and forty-seven enucleations. In this group of cases there were six deaths ; three were due to hemorrhage, two to collapse of the trachea, and one to dropping of a laryngeal polypus into a bronchus. These figures, it will be noted, show a better mortality-rate than is often given (12 per cent. to 17 per cent.), but are by no means equal to Kocher's report on 600 cases.[1]

---

[1] Gazette Médicale de Strasbourg, February 1, 1899.

Enucleation is the safest operation. In 225 operations by Roux, ninety-two of which were enucleations, the rate of mortality was 1.27 per cent.[2] After a partial thyroidectomy, fever and various nervous phenomena are often noted. Such symptoms, which constitute thyroid fever, are due to the absorption of secretion from the gland. The fever may last eight to ten days, and the temperature rises to 102° or even 104°. There is rarely danger in the condition.[3] Sometimes, however, death occurs.

The majority of surgeons have followed Kocher in discarding the use of ether and chloroform in goitre operations. Doyen still gives chloroform, but administers it through a tube, which is introduced into the larynx.[4] Roux abandoned the use of chloroform a long time ago, but has found that post-operative pulmonary trouble is just as apt to occur when chloroform is not given as when it is used. Roux says the actual operation is much safer when no anæsthetic is used ; there is less hemorrhage, the operation is easier, and the patient lets the surgeon know when the trachea is bent or pressed on, and so tracheotomy is sometimes avoided.[5] Girard has very radical views on the question of operating for goitre. He maintains that nearly all goitres demand operation, and even pregnancy is no contraindication.[6]

Dr. M. J. Reverdin,[7] of Geneva, read a very valuable paper on the surgical treatment of goitre before the French Surgical Congress, 1898. He asserts that among the many agents which have been injected, only iodine and iodoform have any value, and even these drugs are only of use in diffuse vascular goitres—the very cases which may get well under medical treatment alone.

According to Reverdin the following are the indications for operation : 1. Urgency (embarrassed respiration or septic inflammation). 2.

---

[1] Progressive Medicine, 1899, Vol. I.

[2] Supplement to Revue de Chirurgie, November, 1898.

[3] Berard, in Transactions of French Congress of Surgery, 1898.

[4] Doyen, in French Congress of Surgery, 1898.

[5] Supplement to Revue de Chirurgie, November, 1898.

[6] Ibid.

[7] Ibid.

Necessity (increase in size in spite of medical treatment or severe functional derangements). 3. Cosmetic.

In a serious case he operates without a general anæsthetic. In a small goitre without dyspnœa he gives ether. When he is in doubt he does not use an anæsthetic.

Reverdin considers the various operations which have been suggested. Wherever possible he employs Socin's method of intraglandular enucleation. In an analysis of over 6000 cases operated on for goitre he finds the mortality to be under 3 per cent., the mortality of complete extirpation being 18.9 per cent., and of intraglandular enucleation 0.78 per cent. The surgeon must be very careful in dividing a vein, as air embolism is not unusual. Large veins should be divided between two ligatures. If during enucleation the hemorrhage becomes profuse extirpation must be performed. In 7 per cent. of Kocher's cases the recurrent laryngeal nerve was injured. In enucleation this danger is very slight. Thyroid fever, first named by Poncet, is apt to occur during healing. Pneumonia is frequent after goitre operations.

If the pressure of the growth has caused atrophy of the trachea the removal of the growth may permit the trachea to collapse during inspiration. Such a condition calls for intubation or the application of sutures to hold the windpipe open.

Secondary Thyroiditis. It has been known for several years that suppurative inflammation of the thyroid gland could arise in the course of a microbic disease. It is due to secondary infection of the gland, and has been met with in the course of pyæmia, puerperal septicæmia, pneumonia, and other conditions. It usually terminates favorably, but is to be considered a grave complication. The gland swells, swallowing becomes painful and difficult, the face is congested, epistaxis may occur, nausea and vomiting are not unusual, and cerebral symptoms may arise. In some cases death occurs before pus forms. Occasionally pus finds its way into the mediastinum or the abscess breaks into the air-passages or gullet. If in the course of microbic diseases the thyroid swells and swallowing becomes painful, the medical attendant should be alive to the possibility of such a suppurative condition arising. In most of the cases which have been studied the infecting organisms were surely conveyed by means of the blood. It is possible that the condition only arises when the thyroid is already diseased and constitutes a point of least resistance.

Dr. B. Honsell,[1] of Tübingen, has recently reported a case of what he calls metapneumonic thyroiditis. A woman who had had a goitre for ten years had an attack of croupous pneumonia. Soon afterward the thyroid enlarged, and after six weeks increased notably in size. There was no fever. An incision was made, pus was evacuated, and from the pus pure cultures of pneumococci were obtained. The patient was cured.

---

[1] Beiträge zur klinische Chirurgie, Band xx., Heft 3.

Kocher cautions us to remember that a sarcoma of the thyroid sometimes grows with such great rapidity that it can be confused with acute inflammation.

Sarcoma of the Thyroid Gland. This disease is rare. Paul F. Morf [1] has collected the records of thirty-nine cases, and has added a case of his own, making forty in all. Since Morf's paper Firth[2] has reported a case. I operated on a large sarcoma of the thyroid two years ago in the Jefferson Medical College Hospital. The operation, which was performed because of threatened suffocation, was difficult and extremely bloody, and the patient died from shock in a few hours. Charles Greene Cumston has recently reported a case of primary sarcoma of the thyroid.[3] Morf shows that sarcoma of the thyroid is more common in countries where goitre is endemic than in regions where it is sporadic; is more common in persons who have ordinary goitre than in those who have not; is more frequently met with in males than in females, and is more usual late in life than in youth.

The course of thyroid sarcoma is very rapid, six to seven months being the average, according to Morf, and the tumor soon passes through the capsule of the gland and infiltrates adjacent parts. This rapid growth is well shown by Firth's case. The tumor in three months grew to such a size as to greatly obstruct the breathing when the patient was recumbent, and to entirely prevent the swallowing of solids.

Morf calls attention to the frequency with which the cervical lymphatic glands are involved (in eighteen of his forty cases), and shows that metastases are frequent (excluding lymphatic involvement they were noted in 45 per cent. of his cases), being especially common in the lungs and bones.

CARCINOMA can occur in the thyroid, and does so even oftener than sarcoma, and the diagnosis between them is difficult, as both may involve the lymphatic glands. A sarcoma is apt to attain a larger size than a carcinoma, and dissemination is less common in cancer. A malignant tumor grows with great rapidity, is most frequently met with in those who are beyond middle age, very soon becomes immovable, and produces early interference with respiration and deglutition.

In Cumston's admirable study[4] he says: "A diagnosis of probable malignant disease can be made if the subject has had a goitre for some time which suddenly begins to grow steadily, with pain on pressure on part of it, or in the entire gland, asthmatic attacks and dysphagia. If we also consider the patient's age, the emaciation and loss of strength, we may conclude positively that a malignant transformation has taken place. Great difficulty may be experienced in the retrosternal type of goitre, which, when malignant change occurs, will give rise to a pericardial exudate or a mediastinal tumor."

---

[1] Journal of American Medical Association, April 29, 1899.

[2] Lancet, August 26, 1899.

[3] Philadelphia Monthly Medical Journal, May, 1899.

[4] Ibid.

The operation for malignant disease is unsatisfactory. It gives a very high mortality, very rarely effects a permanent cure, and is chiefly employed for the palliation of the condition and the relief of urgent symptoms. If we see the case when the growth is still movable and the capsule has not been penetrated, excision gives some small hope of cure.

SURGERY OF THE FACE, NECK, LIPS, TONGUE, AND MOUTH.

Tuberculosis of the Lymph-glands of the Neck. Tuberculosis of the lymph-glands of the neck is a very common disease, especially in children, and is of great interest to practitioners. It is most frequent among children, but is not limited to them by any means. It is often met with among adults, and occasionally even among the aged. George Morgan says that tuberculosis of the neck is not so frequent as it was fifteen years ago.[1] It is the most usual manifestation of tuberculosis in children, and is, according to Dowd, particularly common between the third and tenth years.[2] The superficial cervical glands are the ones most commonly affected. Dowd points out the anatomical arrangement of the glands of the neck.[3] He says: "The neck is richly supplied with lymphatics, both superficial and deep. As seen by the surgeon, they are naturally grouped into two main chains, the anterior and posterior. The anterior chain accompanies the internal jugular vein. The nodes at its top are in close communication with the pharynx, and usually can be palpated when acute pharyngitis or tonsillitis exists. The submental and submaxillary groups communicate with it from in front, and above it there are a few superficial nodes over the parotid which are very rarely involved in tubercular inflammation. The posterior chain includes both superficial and deep nodes, and runs downward and slightly backward from the region of the mastoid. Near its top, under the sternocleidomastoid muscle, it is in close communication with the anterior chain. The arrangement of lymph-nodes in the posterior chain is not so regular or well defined as in the anterior chain."

---

[1] British Medical Journal, August 19, 1899.

[2] Annals of Surgery, May, 1899.

[3] Ibid.

As a matter of fact, in cervical lymphadenitis both chains are usually involved, the one being probably more extensively diseased than the other. Primary infection of these glands from the blood-stream occasionally but rarely occurs. In tuberculous lymphadenitis the bacilli are usually brought from a mucous surface or from some area of tissue infection by the lymph, or, more rarely, by the blood-current.[1] The most usual area from which bacilli are brought is the adenoid tissue of the nasopharynx. Catarrhal inflammation of the nasopharynx strongly predisposes to cervical lymphadenitis. Bacilli may also enter the lymph stream from a wound about the mouth, face, or scalp, from an area of eczema, from a tubercular infection of the external meatus, and from carious teeth. If the cervical glands are enlarged it is the surgeon's duty to look for the seat of entrance of bacilli. It can generally be discovered, but will not always be found. Inability to discover it, however, does not prove it did not exist. A small cut or scratch may not have been noticed by the patient, or may have healed and have been forgotten. It is probable that in all of us bacilli from time to time reach these glands, but as a rule they are destroyed by phagocytosis and the alexines of the lymph. If the patient's tissues are predisposed to infection, if the glands have been so injured as to constitute a point of least resistance, or if numbers of bacilli are admitted, the glands succumb and become enlarged and inflamed (tuberculous lymphadenitis). Catarrhal inflammation of the nasopharynx opens the portals and admits great numbers of bacilli.

The victims of tuberculous lymphadenitis are usually pale, flabby, and anæmic, and suffer from gastro-intestinal disorders, skin diseases, and catarrhal inflammations of the mucous membranes.

In most instances it is the gland nearest the atrium of primary absorption or infection which is first affected. Hence, search particularly for the point of bacillary entrance in the region drained by the diseased group of glands. In some cases the lymph stream may be obstructed and the bacilli may be carried to a more distant gland.

George Morgan[2] says that the occipital, posterior auricular, and superficial cervical glands are usually infected through superficial wounds of the skin or areas of eczema. Spongy gums and carious teeth in a child are often followed by enlargement of the submaxillary and deep cervical glands. The deep cervical glands about the angle of the jaw are infected most commonly from the tonsils and nasopharynx.

It often happens that an infected gland enlarges only temporarily, the bacilli at first predominating, and then being killed (spontaneous cure).

---

[1] J. H. Cameron, in International Text-book of Surgery, edited by J. Collins Warren and A. Pearce Gould.

[2] British Medical Journal, August 19, 1899.

As a rule, however, other glands are successively involved. An enlarged gland may become cheesy, fibrous, or even calcareous. Suppuration may occur. The pus in such a condition is usually sterile, and may have been produced by a mixed infection with pus cocci which die, by the action of tubercle bacilli which die, or by the products of pus cocci. If a suppurating gland ruptures it exposes an ulcer surrounded by livid and undermined skin, and any unhealed tuberculous focus is always a menace to surrounding structures and to the organism at large. It is an important fact that tuberculous infection of the lymph-glands is, as a rule, not nearly so malignant as infection of other structures. The condition is often permanently recovered from, although in the long run it is not uncommonly followed by phthisis.

There are two types of the disease: The first or common form is insidious in onset and slow in progress, requiring some three or four months to caseate. The second or rarer form comes on somewhat acutely, spreads very rapidly, and frequently disseminates to distant parts.

In over one-half of the cases the glands are enlarged on both sides of the neck.

DIAGNOSIS. Dowd[1] makes the following suggestions:

"The diagnosis of this condition is not always easy. Inflammations of the cervical lymph-nodes frequently follow the exanthemata, pharyngitis, tonsillitis, diseases of the scalp and other infections. These ordinarily run an acute course. Diagnosis between tubercular inflammation and acute infection by pyogenic bacteria is usually made with ease. There are, however, a few instances of chronic enlargement of the lymph-nodes which are most difficult of diagnosis—cases in which the nodes are not greatly enlarged, nor is there any appreciable change in their size from month to month, and little or no pain. A large proportion of such cases is without doubt tubercular; in some there is a slight inflammation somewhere about the head which is the exciting cause. Volland estimates that 68 per cent. of all enlarged cervical lymph-nodes are tubercular. Nicoll estimates the number as 80 per cent.

"The use of tuberculin has been suggested to determine whether suspected cases are tubercular or not. Otis, of Boston, has found that the reaction from the injection of tuberculin corresponds very closely to clinical appearances in cases of enlarged lymph-nodes. Trudeau, Northrup and other observers have found that this test is of considerable value, although not to be relied upon implicitly. The enlargement, which is due to cancerous or syphilitic disease, can usually be diagnosticated by the accompanying conditions. Lymphosarcomata seldom exist in the neck alone, but are disseminated through other parts of the body."

---

[1] Annals of Surgery, May, 1899.

TREATMENT is of great importance. Recent cases can frequently be arrested without operation. The constitutional treatment is the same as that employed for a tuberculous condition in any region. It consists of sunlight, fresh air, warm sea-water baths, nourishing diet, and the administration of syrup of iodide of iron and cod-liver oil. Locally, ichthyol, mercurial ointment, iodoform ointment, ointment of iodide of lead, or potassium iodide ointment should be rubbed in lightly twice daily. If in two or three weeks the glands have not lessened in size or have increased in size, remove them radically. In early operations periadenitis is rarely found. The glands can be removed entire, and the surrounding fatty tissue may be allowed to remain. This tissue is of great importance, because, as has been shown by Bayer and by Fenger, it is capable of forming new glands.[1] I believe in this early radical operation in preference to waiting for softening, and then opening and scraping area after area as it breaks down—that is, I believe in it if the patient is in fair general condition. If the patient is much debilitated it is not to be thought of. By the first method we rapidly remove the trouble, and thus diminish the chance of additional regional trouble and of general involvement, and leave but a trivial scar. The latter process drags over months and months of discharge and discomfort, during which time the disease may spread locally and even generalize itself, and though a cure may be obtained eventually disfiguring scars remain.

J. W. Kyger[2] well says that radical operation greatly shortens the duration of the disease, prevents disfiguring scars, and lessens the danger of infection in other regions.

When the gland has softened an attempt should be made to dissect it out, and if there is not much periglandular inflammation this can be accomplished. If it is found impossible to remove the adherent masses the diseased area should be scraped with a curette, sinuses should be traced out, particularly under fascia, and packed with iodoform gauze. If an abscess breaks spontaneously the purple and undermined skin should be cut away, the broken down glands should be scraped away, and the wound packed with iodoform gauze. Such a procedure will be followed, of course, by a scar, but not by the jagged, livid, puckered scar which is so frequently seen after an abscess has ruptured and healed, the purple skin not having been removed.

Tuberculous abscesses after opening should be injected daily with an emulsion of iodoform or with formalin and glycerin—one to five parts of formalin in 100 of glycerin.[1] Dowd[2] speaks thus of the radical operation, and uses the following incision :

---

[1] Christian Fenger, in Supplement to Keating's Cyclopædia of Diseases of Children.

[2] Kansas City Medical Index-Lancet, May, 1899.

"The writer has used the following incision nine times with very satisfactory results. It is carried transversely under the border of the lower jaw and backward as far as the mastoid process, and there deflected downward along the hair-border, the hair having previously been shaved. It extends as far forward and as far downward as the extent of the disease renders desirable. This skin-flap is then dissected and turned forward and downward. This exposes the entire posterior chain, and the anterior chain about two-thirds of its distance toward the clavicle, also the submaxillary group and, if necessary, the submental group. A separate incision may be made over the lower part of the anterior chain, if necessary ; it is not prominent, as it lies below the collar-line. After the healing the scar from this operation hardly shows. The transverse part is under the border of the jaw and is less noticeable on account of the slight shadow which naturally exists there, and there is little tendency to stretch ; the vertical part is partially hidden by the hair and the collar, and is situated so far back that it is only slightly noticeable."

In many cases it is wise to cut the sternocleidomastoid muscle, and occasionally it is advisable to divide the omohyoid. If muscles have been cut they should be sutured with catgut. In rare cases it will be necessary to ligate the internal jugular vein, or even to remove a portion of it, as practised by Watson Cheyne. An effort is always made to avoid injuring the nerves. It is often necessary to cut some superficial branches of the cervical plexus, and occasionally the spinal accessory nerve cannot be preserved (Dowd).

Rhinoplasty. The so-called Italian method of rhinoplasty is not frequently employed at the present time. This method is often spoken of as the Tagliacotian, after its inventor, Tagliacozzi, who lived in Italy in the sixteenth century. In this method a flap is partially detached from the left arm of the patient, and is left in this condition for two or three weeks so that it may become vascular. When it becomes sufficiently vascular the nasal stump is made raw, the flap is pared into the required shape, and the raw flap is sutured to the raw stump of the nose, and the arm is held against the head by bandages or a mechanical apparatus. In from ten days to two weeks the nose is cut free from the arm, and is improved by trimming. Later a columna is cut from the upper lip. The protracted fixation of the arm, which is necessary in this operation, is productive of great discomfort, and the procedure has of recent years been rarely employed.

---

[1] Hahn, in Centralblatt für Chirurgie, June 17, 1899.

[2] Annals of Surgery, May, 1899.

P. Berger[1] has of late advocated the Tagliacotian operation. He says the operation must be planned beforehand to the most minute details, and the plan must be rigidly adhered to. He restricts the method to individuals under forty years of age, and finds it does very well in children, who tolerate without damage and serious inconvenience prolonged elevation of the arm. The arm should be fastened for at least eight days. Berger uses a gauntlet reaching above the elbow and made of elastic cloth. This is buckled to a hood of dogskin which fits around the head, neck, and shoulders. Berger's apparatus allows of some slight motion of the arm, and does not restrict the circulation.

It is a well-known fact that if a small bit of the nose has been cut off by accident it can often be made to unite if sutured in place. This fact was known years ago to the inhabitants of India. In former times a usual punishment ordered by the native rulers was the cutting off of the nose. It is said that occasionally the victim picked up the portion which had been cut off and succeeded in keeping it in place until it adhered. It is a surgeon's duty whenever possible to suture in place any portion of the nose which may have been cut off. Sometimes a very large piece will adhere.

Dr. Abbott-Anderson has reported an interesting case in which union was obtained after a large piece of the nose was sutured in place.[2] This patient was a man, aged thirty years, who accidentally cut off a piece of his nose one and one-quarter inches in length. The man went to a druggist who sent him to a doctor's office, where he waited fifteen minutes. Anderson asked for the piece. A boy was sent to find it, and came back with it in ten minutes—thirty-five minutes after the accident. The piece was soaked in a warm solution of boric acid, and the raw portion of the nose was asepticized. The piece was sutured in place, and for the next ensuing four hours hot compresses of borated lint wrung out in hot boric acid solution were kept upon the part and changed every five minutes. At the end of four hours the suture line was dusted with europhen and dressed as follows: A layer of green protective, wet borated lint wrung out in boric acid solution, dry borated lint, double cyanide wool, a gonorrhœa bag to act as a muff, and a bandage. The wound healed by first intention.

Epistaxis, or bleeding from the nose, is very frequently encountered. The blood usually comes from one nostril only, but if the nasopharynx is the seat of trouble the blood may come from both nostrils. Usually the bleeding is trivial, and is arrested spontaneously or by ordinary domestic means; but occasionally it persists, and active measures must be taken to stop it. If the bleeding is persistent or recurrent, the blood coming away in drops, the nares and nasopharynx should be explored by means of mirrors to locate the seat of trouble, to recognize its nature, and to permit of local treatment. In a serious case in which the blood flows in a stream it will be impossible to see in the bloody cavities, and Carl Seiler tells us that the physician must insert his little finger or a probe and be guided by the sense of touch.[1] Seiler[2] says the causes of copious hemorrhage are numerous, and he divides them into : 1. Acute traumatic (due to blows, falls, surgical operations, etc.). 2. Chronic traumatic (due to the frequent repetition of slight injuries, congestions from forcible sneezing, etc., movements of impacted foreign bodies, picking the nose, formation of ulcers, etc.). 3. General symptomatic (when menstruation is suppressed, in typhoid fever, in malaria, sunstroke, hæmophilia, the epistaxis of mountaineers and aeronauts). 4. Local symptomatic (those causes depending upon the structure of the nasal mucous membrane and underlying tissues. Because of the delicacy of these tissues and because of their function they are liable to sudden increases of blood pressure and to hemorrhage from trivial causes, such as sneezing, mental emotion, etc.).

---

[1] Bulletin de l'Academie de Médecine, Paris, July 11, 1899.

[2] Lancet, March 11 and April 29, 1899.

When dealing with a case of epistaxis Seiler's rule of procedure is as follows : Remove all constriction from the patient's neck, have his head inclined somewhat forward, grasp the alæ of the nose with the fingers or a clamp, and wait for a clot to form. While waiting for a clot to form inquire into the patient's history, in order to learn if the bleeding be acute traumatic, chronic traumatic, symptomatic, or local in origin. After a clot forms remove external pressure and have the patient expel the clot by gently blowing the nose without a handkerchief and without grasping the alæ. When the clot is expelled a dilator is inserted into the nostril and a light is reflected into the nasal cavities. If bleeding begins and is so profuse as to obscure the parts insert a plug of cotton soaked in a 4 per cent. solution of cocaine, and leave it in place a few minutes. The constricting action of cocaine may arrest a bleeding point in the anterior nares. If cocaine fails examine with the little finger or a probe.[3] Seiler says that in most cases of so-called spontaneous epistaxis an ulcer will be found, and in such a case curetting down to sound tissue will stop the bleeding because the induration is thus gotten rid of and vessels are reached which possess normal powers of contractility. He covers the curetted surface with a plug of spunk such as dentists use, or with a piece of fat ham or lean bacon, as suggested by Agnew.

Seiler is opposed to plugging the nostril with cotton or lint or any other fibrous material, because the fibres become adherent and tear the tissue when the plug is removed, and wax should not be used for the same reason. Seiler suggests that if it is found that the local cause of the bleeding is the presence of a foreign body or a rhinolith, polypi, or posterior hypertrophy, such conditions should first be removed and the bleeding should then be arrested.[1] That Dr. Seiler's conclusions are sound we have no doubt, but many cases of epistaxis are treated by surgeons and general practitioners, and many of us lack the dexterity, information, and instruments to proceed as Seiler suggests. I doubt greatly if I could recognize a small ulceration by the use of a probe. It may be that plugging the nares is unscientific, and that in the removal of the plug newly formed tissue will be torn loose; but it is certain that hemorrhage can usually be arrested by plugging, and that it is often urgently necessary to quickly arrest it. It might be better for the case to be treated by a specialist, but emergencies do not as a rule make appointments. A serious hemorrhage must be arrested as quickly as possible, and it is better to plug the nares than to let the patient bleed. The plug may be cotton or gauze saturated with peroxide of hydrogen; absorbent cotton saturated with oil (Gleason); non-absorbent cotton saturated with cosmoline or albolene or peroxide of hydrogen (Crawford); a strip of iodoformized lint (Ingals and Ohls); gelatin in normal salt solution (5 parts of gelatin in 95 parts of salt solution, after plan of Carnot).

---

[1] Medical Record, May 27,1899. [2] Ibid. [3] Ibid.

In some cases hemorrhage is promptly arrested by the simple injection of ʒj of peroxide of hydrogen, by the injection of a 6 per cent. solution of antipyrine or of gelatin and normal salt solution (5 parts to 95).

If the anterior and posterior nares are plugged the material must not be too tightly forced into place, or else the mucous membrane may be devitalized from pressure. The plugs must be removed as soon as is safe after the arrest of the hemorrhage. If kept in long, decomposition may take place and sapræmia result. "Forty-eight hours should be the extreme limit for their retention."[2] After removing the plugs the nares must be cleansed and the patient is cautioned of the danger of renewed bleeding, and is ordered to refrain from energetic exercise and mental excitement for several days.

Alveolar Abscess. This is usually, in a surgical sense, a rather trivial affair. An alveolar abscess may be superficial or deep. The superficial form of the disease is the ordinary gum-boil. The deep form usually arises in a tooth socket as a result of a septic condition of a pulp-cavity or the root of a dead tooth. That alveolar abscess may be occasionally very dangerous is a recognized fact. Some years ago I saw a patient die of pyæmia as a result of an alveolar abscess. Dr. F. Willcocks reported a fatal case in the *Lancet* for June 25, 1898. John Edmunsun[1] reports the case of a boy, aged fifteen years, who suffered from an alveolar abscess. Cellulitis developed, and pyæmia with metastactic abscesses followed. Very rarely Hodgkin's disease follows alveolar abscess, a sequence which suggests that the former disease is due to infection.[2] That such cases may arise proves that alveolar abscess must not be trifled with, and that the offending tooth, temporary or permanent, should be extracted. Truly, there is no surgical malady which should be regarded as trivial. There is nothing small or unimportant in surgery.

---

[1] Medical Record, May 27, 1899.

[2] D. Braden Kyle, on Diseases of the Nose and Throat.

Division of Steno's Duct. This is an unfortunate occurrence, and yet in removing tumors from the face it is sometimes necessary to cut it. Robert Abbe[3] has reported a case in which he removed over one inch of the duct during the extirpation of a sarcoma. He succeeded in anastomosing the cut ends of the duct together. The outer end was stretched, and by means of a suture one end was drawn into the lumen of the other end. The duct was supported by deep catgut sutures, and a Thiersch graft was employed to fill the gap in the cheek left by the removal of the tumor. Primary union was obtained.

Abbe's paper was read before the New York Academy of Medicine. In the debate Morris called attention to the plan he had adopted in two cases—anchoring the proximal end of the duct to the cheek so that the duct will discharge into the mouth. The plan pursued by Morris is similar to the method of Goris in treating fistula of Steno's duct. Goris dissects up the duct from its point of origin to its point of termination, and fastens the end in the cheek, back of its natural location.

The Use of Caustics in the Treatment of Epithelioma. These, I believe, should be restricted to very trivial cases, to cases in which removal by the knife is refused, and to cases which are superficial but very extensive in area. The knife is more thorough than caustics. By means of it we can go wide of the growth, and it enables us to remove adjacent lymphatic glands. Adjacent glands should always be taken away and cannot be removed by caustics. Caustics cause more pain and require longer to accomplish removal of a growth than does the knife. A. D. McConachie[4] does not agree with the above conclusions. He advocates the use of caustics, claiming that they effect a more thorough removal with less disfigurement. He does not approve of the electric cautery or the Paquelin cautery, especially if the disease is extensive. He uses caustic potash, chloride of zinc or arsenic. In epithelioma of the face he uses Marsden's paste (2 parts of arsenous acid and 1 part of gum acacia).

---

[1] Lancet, August 27, 1899.

[2] Case reported by E. G. Wood, in New York Medical Journal, August 19, 1899.

[3] Medical Record, April 22, 1899.

[4] Maryland Medical Journal, June 10, 1899.

Ligation of the Internal Jugular Vein. This is a not unusual operation. It is necessary to ligate it every now and then in order to remove tumors or enlarged glands from the neck. W. Watson Cheyne advocates removing a section of the vein with a tumor which adheres to it. The operation is regarded as safe, and ill consequences rarely follow its performance. E. Kummer[1] has reported a case in which ill consequences did follow ligation. He resected half of the lower jaw of a woman for cystic adenoma, and in doing so was obliged to ligate the external carotid artery and the internal jugular vein. The patient became comatose shortly after the operation, and died in five hours. At the post-mortem examination there was congestion of the pia mater and choroid plexus, areas of hyperæmia in each frontal lobe, and a sanguinous effusion into the fourth ventricle. Kummer states that death was not due to chloroform or poisoning by antiseptics, but was due to the ligation which produced venous congestion and cerebral paralysis.

Retropharyngeal Abscess. There are two forms of retropharyngeal abscess—the acute and the chronic. The former disease occurs particularly in children under four years of age, and arises as a retropharyngeal cellulitis or an adenitis of the prevertebral lymph-glands, due to infection with the bacteria of suppuration. The bacteria enter the lymph stream from a diseased area in the mouth or nasopharynx or in the skin, or pass directly to the cellular tissue through a breach of continuity in the mucous membrane of the pharynx. The usual custom is to open an acute abscess from within the mouth. The projecting swelling is large, and if not operated upon will rupture and may then cause suffocation by the pus running into the trachea and bronchi. The patient is placed on the side with the head hanging down a little over the side of the bed, or else upon the back with the body higher than the head. The jaws are held apart with a mouth-gag, and the abscess is opened with a bistoury. After the pus discharges it is wiped away, and the mouth is washed at frequent intervals with an antiseptic solution.

Some ten years ago Burckhardt entered a protest against draining acute abscesses through the mouth, because it is difficult to keep the incision open, and because the abscess after being opened cannot be treated on antiseptic principles. Burckhardt opens the abscess through an incision at the inner edge of the sternocleidomastoid muscle.

Bokay,[2] of Budapest, writes on the treatment of acute retropharyngeal abscess. As soon as signs of retropharyngeal adenitis appear Bokay applies an ice-bag to the submaxillary region or else to the side of the neck on which the adenitis is manifesting itself. If the swelling does not quickly improve the use of cold is abandoned and the suppurative process is hastened by warm applications. The author incises the abscess through the mouth, using Schmitz's pharyngotome. The child is placed erect on the nurse's lap. The head and back of the child rest against the chest of the nurse, and the nurse's arms encompass and hold the arms and body of the child. An assistant grasps the child's head, holds it and makes pressure with his fingers upon the submaxillary and postmaxillary regions, in order to immobilize the abscess to some extent. The mouth is opened, and the index finger of the left hand is inserted as a guide to the instrument. The instrument, carried by the right hand, is pushed along the guiding finger and is made to enter the most dependent part of the abscess. Quickly after making the incision the child's head is bent forward until the chin strikes the chest. This position favors the flow of pus through the pharynx and mouth. After most of the pus has been evacuated a finger is again introduced into the mouth and pressure from below upward is made upon the inferior portion of the abscess, the external pressure being also maintained. After the operation the throat should be rinsed out at frequent intervals with a solution of boric acid, and the contents of the abscess should be regularly expelled by pressure with the index finger. Bokay's operation is rapid and satisfactory, although I consider a knife to be as useful as the more complicated instrument.

---

[1] Revue de Chirurgie, April 10, 1899.

[2] Annals of Gynecology and Pediatry, May, 1899. Bokay's article, translated by Dr. E. M. Plummer.

Tuberculous abscess should never be opened through the mouth. Bokay, in the previously cited article,[1] admits that retropharyngeal abscesses due to tuberculous disease of the vertebræ should be reached by an external incision. To open the abscess by way of the mouth is to render mixed infection of the area inevitable, and mixed infection of a cold abscess is extremely dangerous, especially if the infected area cannot be completely drained and asepticized. Again, when such an abscess has been opened through the mouth, the constant swallowing of tuberculous material is a menace to the gastro-intestinal tract and to the entire organism.

An external incision enables the surgeon to thoroughly drain and disinfect the abscess cavity, often to remove carious bone at the focus of origin of the disease, and always to apply ample antiseptic dressings. The incision through the mouth is easy but usually disastrous. The external incision is more difficult but vastly safer. The incision can be made at the anterior edge of the sternocleidomastoid by the method of

---

[1] Annals of Gynecology and Pediatry, May, 1899.

Burckhardt, or, as I prefer, at the posterior edge of the muscle after the plan of Hilton.

Phlegmon Ligneux du Cou. Reclus has described a deep-seated suppurating lesion of the neck under this name.

The course of this rare disease is extremely chronic. An extensive area swells, reddens, and becomes densely hard. After many months, it may be, pus forms. The condition is usually confused with sarcoma, and some reported cases of sarcoma may have really been instances of wooden phlegmon of the neck. M. M. Kusnetzoff [1] has recently written upon this disease. He holds that it is often impossible to make a diagnosis between wooden phlegmon and malignant growth, and the diagnosis is only arrived at when cure is obtained. He believes wooden phlegmon is a chronic infection due to the introduction of bacteria whose powers for harm have been modified and lessened, but not completely destroyed. The symptoms of the condition, according to Kusnetzoff, are as follows: A phlegmonous induration appears deeply in the lateral or anterior cervical region, and spreads very slowly but extensively. The skin finally becomes red and infiltrated. There is no fever, no heat, no severe pain. After many weeks or even months the skin becomes œdematous, and small foci of suppuration form here and there in the depths of the indurated area.

Division of the Vagus in the Neck. It used to be thought that this would produce death. We now know that division of one pneumogastric nerve can be carried out if surgical necessities demand it. Roswell Park some years ago collected fifty cases in which the pneumogastric was injured in operations on the neck, and concluded that it is not a fatal accident, and no symptoms directly follow division. Dr. Page recently reported to the Northumberland and Durham Medical Society[2] a case of malignant growth of the neck in which a portion of the pneumogastric nerve was removed with the tumor, no bad results following. S. Spicer and H. Stansfield Collier[3] report a case which indicates that the pneumogastric can be divided without producing death, but that very dangerous symptoms may possibly arise as a result. The patient of Spicer and Collier suffered from a sarcoma of the carotid sheath. The jugular vein and carotid artery were ligated on the thoracic side of the tumor, and the vein, artery, and vagus were divided at this point, no symptoms resulting. The growth was dissected upward, the artery and vein were tied and cut at the level of the hyoid bone. As the vagus was being isolated on the cephalic side of the growth, breathing first became very shallow and alarmingly infrequent, and then completely ceased. After employing artificial respiration for two minutes, breathing began, the operation was completed, and the patient recovered. In this case it is difficult to affirm that injury to the vagus caused the respiratory trouble. When the nerve was cut below the tumor, immediate symptoms, at least, did not occur. How interference with the nerve on the cephalic side of the growth could cause trouble after division of the nerve on the thoracic side had produced no difficulty it is hard to say.

---

[1] Archiv für klinische Chirurgie, Band lviii., Heft 3, 1899.

[2] Lancet, April 12, 1899.

[3] Ibid., August 5, 1899.

Carcinoma of the Tongue. This is one of the very worst forms of cancer. It spreads with great rapidity; it very quickly produces extensive glandular involvement; it causes great pain and fearful discomfort; the breath becomes hideously foul; fatal septic trouble is apt to arise at any time, and the operation required is severe, is disabling, and has a large mortality from septic complications. W. Watson Cheyne[1] considers the tongue to be about the worst place in which a cancer can arise. The mortality of operation may be somewhat lessened if the mouth and teeth are carefully cleansed beforehand. Before removing the tongue Cheyne[2] has all stumps of teeth removed, and during the two or three days immediately preceding operation he has the mouth and teeth scrubbed three or four times a day with an antiseptic powder and washed with a non-irritating antiseptic. My custom is to scrub the teeth with soap and water twice a day, and to wash the mouth, nares and nasopharynx every three hours when the patient is awake, first with peroxide of hydrogen and then with boric acid solution. Thirty-six hours before operation Cheyne injects 20 c.c., and twelve hours before operation 10 c.c. of antistreptococcic serum. Cheyne says that sepsis will be most apt to be avoided if the tongue during the operation is handled gently and is not bruised, if the raw surface is brushed over with a 10 per cent. solution of chloride of zinc, and if as much as possible of the wound within the mouth is sutured. He estimates the mortality when the above plan is used for cancer of moderate extent at 5 to 10 per cent. For partial removal Cheyne employs Whitehead's method, and for complete removal Kocher's method. He does not consider that involvement of the floor of the mouth of necessity contraindicates operation, but it does make necessary the removal of the sublingual glands.

Most surgeons agree that the anterior and submaxillary triangles should be cleaned out. Some do this at the time of the operation on the tongue, some before, some after. Cheyne's rule of procedure is eminently wise. He says: If there is little or no glandular involvement it may be proper to first remove the tongue and after a week or two clear the triangles. If there is marked glandular involvement the disease in the glands grows much more rapidly than the disease in the tongue, and this is particularly true after a wound in the mouth becomes septic. In such a case the glands must be removed before the tongue. If they are not removed before the tongue, when the tongue has been taken away, the glands may enlarge so rapidly and in so brief a period as to render removal impossible. In most cases clear out the submaxillary and anterior triangles before removing the tongue, tying the lingual artery at this time, and a week or two later remove the tongue. If this plan is followed the wound in the neck heals before the tongue is removed, and cellulitis and secondary hemorrhage are avoided. If, however, the disease in the mouth is very far advanced both operations should be done at one seance.[1]

---

[1] Practitioner, April, 1899.

[2] Ibid.

That even very advanced cases of this terrible disease may occasionally be cured is shown by a recent report from Christopher Heath.[2] In 1875, Heath took charge of a man, aged fifty-two years, who suffered from a very extensive cancer of the tongue. The tongue and floor of the mouth were involved, the tissues beneath the jaw were invaded, and the carcinomatous submaxillary glands were swollen and fungating. Saliva dribbled constantly, and the patient could scarcely speak and could not protrude his tongue. Heath sawed the jaw on each side and passed the wire of a galvano-écraseur around the diseased area. He removed in this way the middle three inches of the jaw, the tongue, the floor of the mouth, and the sublingual muscles and glands. Microscopical examination proved the disease to be carcinoma. The two portions of the jaw gradually fell together and united. The stump of the tongue grew markedly, and the patient became able to talk and to eat reasonably well. This man lived for twenty-three years, and recurrence never took place. He died in 1898 from senile changes.

Carcinoma of the Lip. Cancer is frequently met with in this situation. It most usually arises at the junction of the skin and mucous membrane, but may begin at some distance from the margin in either the skin or mucous membrane. The upper lip is comparatively rarely affected. Fricke[3] finds that of 1193 cases of cancer of the lip the lower lip was affected in 1130 cases, the upper lip in sixty-three cases. Hence the disease "is nineteen times as frequent on the lower as upon the upper lip." The disease is far more frequent among men than among women. König holds that it is met with twenty times among men to once among women. Warren observed four cases in women out of seventy-three cases. Among 1264 cases in Fricke's report ninety were women. Fricke also calls attention to the fact that the upper lip among females is more often affected as compared to the lower lip than among males (in men 4.3 per cent. of cases, in women 27.4 per cent. of cases).

---

[1] Practitioner, April, 1899.

[2] Lancet, May 20, 1899.

[3] Therapeutic Gazette, from Deutsche Zeitschrift für Chirurgie.

The carcinoma usually begins as an indurated area which soon ulcerates, but the induration may be preceded "by a crack or a fissure or an eczematous condition of the margin of the lip" (Senn, on Tumors).

Heredity does not seem to play much of a part in cancer of the lip. A wound or an abrasion may be the starting-point of the disease (Fricke). It is usually thought that the greater frequency of the disease among men is due to smoking, and yet the same sexual liability is said to maintain in countries where women smoke. It is interesting to recall that out of Warren's four female cases three were smokers.

The probabilities are that cigars or cigarettes do not predispose to the disease nearly so much as do pipes. A pipe with a short stem, which gets very hot when smoked, is the most dangerous. Most pipe-smokers get in the habit of holding the stem in a fixed place by means of the teeth, and hence a limited area of the lip is repeatedly bombarded with irritations. A curious fact observed by Fricke is that a large proportion of those affected with labial carcinoma are open-air workers, particularly farmers.

After the disease has existed for a variable time the submental and submaxillary lymphatic glands become carcinomatous. It is not unusual, however, for the glands to enlarge as a result of septic absorption from the ulcer before carcinoma has developed in them. Fricke says that enlargement and even induration do not positively indicate carcinoma of the glands, since enlarged glands removed by operation are sometimes found to be free of cancerous disease. This fact should be borne in mind lest we hastily conclude that a case is inoperable because of extensive glandular involvement. It is of even greater importance to remember that the glands may be cancerous when no enlargement can be detected by external manipulation. In several recent cases after opening the submaxillary triangle no glands could be felt, but the fatty matter was removed and a careful examination showed that it contained several minute areas of cancer. Therefore it is not possible to say the glands are not involved even when an incision has been made below the chin. The only safe rule is to clear away the fat and contained glands.

Cancer of the lip, if unoperated upon, extends progressively, destroys the lip, involves the adjacent glands, the floor of the mouth and the periosteum and bone of the lower jaw, and kills the patient, Senn says, in from three to five years.

If the case is thoroughly operated upon at an early period the prognosis is good, and from 50 to 60 per cent. will probably be cured. Fricke says that 8 per cent. will die directly from the operation; in 32 per cent. the growth will recur; in 60 per cent. a permanent cure will be obtained. Cheyne says 40 per cent. are cured. By a thorough operation is meant the removal of the growth and a considerable area of apparently sound tissue around the growth, and in addition the removal in every case of the adjacent lymph-glands and the fat in which they are embedded. Fricke removes the fat and glands before he removes the tumor, a procedure which does not seem essential or even particularly valuable. In several of my cases in which before and even during operation no glandular enlargement could be detected, microscopical examination of the glands and fat removed from beneath the chin has proved that the glands were cancerous. In a number of cases in which no glandular enlargement could be detected before operation, enlargement was perceptible after making an incision beneath the chin. The removal of a carcinoma of the lip should be conducted on the same principles as the removal of a cancer of the breast : radical removal of the growth and of tissues well wide of it, and also of lymphatic glands into which the diseased area drained. When the glands are involved the prognosis is worse than when they are free. The more extensive the involvement the worse the prognosis. If the jaw is involved the prognosis is very bad, and it is almost hopeless if the floor of the mouth is also involved. In view of the liability of ulcerations on the lip to develop into carcinoma, Fricke advises that every ulceration which does not soon heal should be cut out by means of scissors after the area has been locally anæsthetized.

In operating upon cancer Fricke goes two-fifths of an inch wide of all infected tissue. This is satisfactory if it is positively wide of the diseased tissue, but we must remember that in tissue which appears sound there may be microscopical infection. I believe it wiser to go even wider of the obvious disease—one-half an inch at least. Deformity is to be chosen in preference to recurrence. In 113 cases in which Fricke's rule was followed there were only three instances of local recurrence. If a tumor involves but a small portion of the lower lip it can be removed by a V-shaped incision, the point of the V reaching the lower margin of the jaw. The same incision may be employed for limited growths of the upper lip. In extensive cases the entire lip must be removed, a new lip being formed by a plastic operation. It matters not which lip is diseased, the submaxillary and submental glands should be removed.

W. W. Grant[1] has devised a new operation for carcinoma of the lip. The operation comprises removal of the growth and cheiloplasty, and the principle is applicable to the upper as well as to the lower lip. Grant maintains that the surgeon must not only remove the growth thoroughly, but must regard, especially in women, the future "usefulness and appearance of the parts," and should aim to preserve, as far as can be done, "the size and shape of the normal mouth," an orifice which, he reminds us, should admit "the first three fingers of the hand, side by side." Grant says, and I think truly, that the V-shaped incision should only be used when the growth is small and the mouth is large, because this operation sacrifices considerable tissue needlessly to permit of smooth approximation of the flaps, and after coaptation there is great tension at the base of the flaps, the lip is much contracted, the mouth becomes round instead of oval, and the upper lip overhangs the lower.[1] Grant approves of taking the flaps from the mobile portions of the lip and cheek.

---

[1] Medical Record, May 27, 1899.

Grant's operation seems to me an admirable one. I have performed it once with much satisfaction. Professor Keen employs it, and speaks highly of it. The operation is performed as follows: Make a straight perpendicular incision on each side of the growth, extending well below its lower level. Unite these incisions by a transverse one. A square block of tissue containing the growth is thus removed. Make an oblique incision from each lower angle of the wound. Each of these incisions passes "downward and outward over the upper and lateral surface or border of the chin." These incisions can be extended below the chin to permit of the removal of lymph-glands. The oblique incisions form two large triangular flaps which can be made with slight traction to slide over the chin, and which can be approximated with little tension. The flaps are united in the centre with four sutures of silkworm-gut, and united to the chin with a continuous catgut suture. If the entire lip is removed oblique incisions will be made from the angles of the wound and also from the angles of the mouth.

Figs. 1 and 2 show the operation as applied to a median growth, and Figs. 3 and 4 as applied to a growth on one side of the lip. These figures are diagrammatic, and have not been taken directly from Grant's cuts in the *Medical Record*.

A new modification of cheiloplasty has been suggested by J. Silberger.[2] He applies this principle to both a V-shaped and a square defect. He does not carry the incision into the cheek further than the angle of the mouth beyond the margin of the lip. The incision is then continued along the outer margin of the mucous surface to such a distance that when the defect is closed by approximating the two flaps the portion of the opposite lip which was freed forms the angle of the mouth, and when it is carried over makes the sides of the new lip of equal length. In other words, in

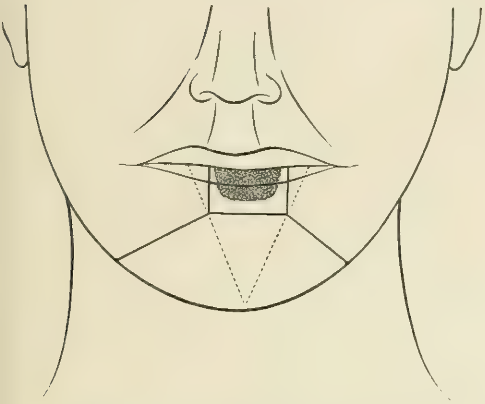
---

[1] Medical Record, May 27, 1899.

[2] Centralblatt für Chirurgie, May 27, 1899.

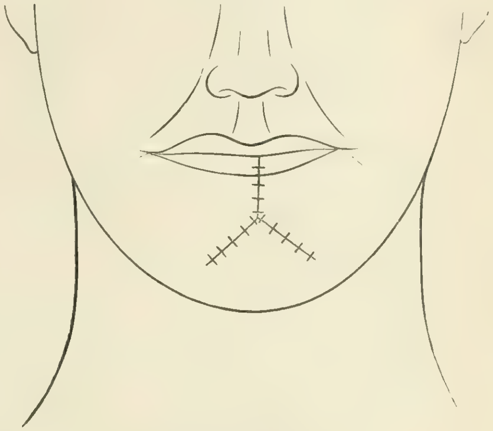
Silsberger's operation the object is to retain a fragment of lip at each corner after excision of the growth by a square incision. An incision is carried horizontally into the cheek, in order to relax tension sufficiently to permit of the easy drawing of these fragments together. "Another parallel incision at the bottom of the gap, extending on each side, allows the mobilization of the lower portion of the flaps." If the original incision has been V-shaped the mobilizing incisions are carried obliquely upward from the angles of the mouth and then downward. An inverted Λ is thus formed, the point of which is toward the ear.

Fig. 1.



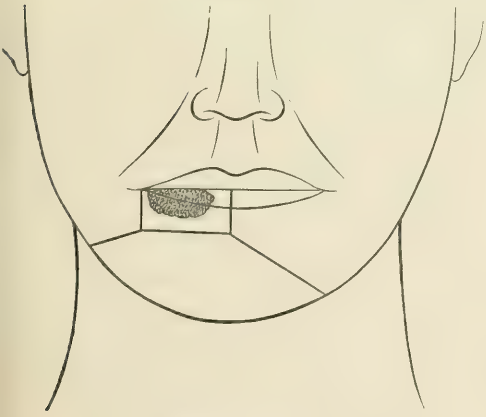
Before operation. The dotted lines represent the usual V-operation—the other lines the new method.

Fig. 2.



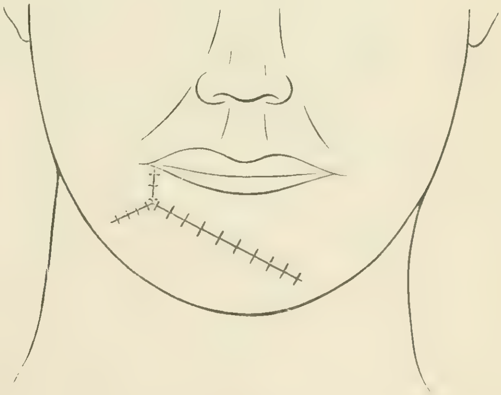
After operation.

Fig 3.



Before operation.

Fig. 4.



After operation.

A. Stieda[1] restores the lower lip in the following manner: The lower lip is removed by an incision which leaves an arch-shaped gap. An incision parallel to the first incision is carried across the region of the double chin. The flap is freed up to the edge of the lower jaw and is separated from the bone. The new lower lip is formed by drawing this flap upward like a visor. The flap is held to the chin by means of a nail, and a few sutures are applied. The gap is allowed to heal by granulation.

A Ranula, it is usually taught, is a retention-cyst of the ducts of the submaxillary or sublingual gland. Mintz[2] believes that a ranula is a retention-cyst of the submaxillary gland. He agrees with Hippel, who maintains that the primary cyst begins in the excretory ducts of the gland, and disagrees with Suzaune, who thinks that the cyst is due to degeneration of the acini. Every cyst which occurs in the floor of the mouth is not to be called a ranula, for mucous cysts are common in this region. The mucous glands of Nuhn and Blandin on either side of the frænum of the tongue often become cystic from obstruction of their outlets. This condition is usually called ranula. A ranula at first contains saliva, but after a time the retained saliva undergoes changes and finally resembles mucus. Nicholas Senn says that Rivini's duct is as commonly the seat of retention-cysts as is Wharton's duct. In several cases he has seen Wharton's duct distended to the size of a walnut, has discovered the orifice of the duct on the wall of the cyst, and has by pressure been able to empty the cyst through the constricted orifice. He concludes that ranula may follow partial occlusion or total closure of Wharton's and Rivini's ducts, due to inflammation or cicatricial contraction.

TREATMENT. A true mucous cyst can be readily cured by an intraoral operation. A piece of the cyst-wall is cut away and the interior of the cyst is cauterized with pure carbolic acid. A true ranula should be excised, and the gland should also be removed. Mintz[3] advocates radical operation. He removes the gland as well as the cyst, and does this through an external incision below the jaw. He holds that any lesser operation will often fail to cure.

Lingual Psoriasis or Leucoplakia. In this disease, areas of mucous membrane become glistening white or pearly gray in color. If this whitened tissue is removed bleeding is produced. The condition is very chronic, and is an inflammation of the mucous membrane of the tongue. It rarely produces much annoyance, although it may cause a burning sensation. The cause of the disease is uncertain. Some consider it the result of tertiary syphilis, some think it is produced by smoking and chewing. It is true that a rather large proportion of those who suffer from leucoplakia admit having had syphilis, but the condition is not benefited by specific treatment. Many of the victims are smokers, and smoking and chewing aggravate the disease, but it may occur in those who never have used tobacco.

---

[1] Deutsche medicinische Wochenschrift, March 30, 1899.

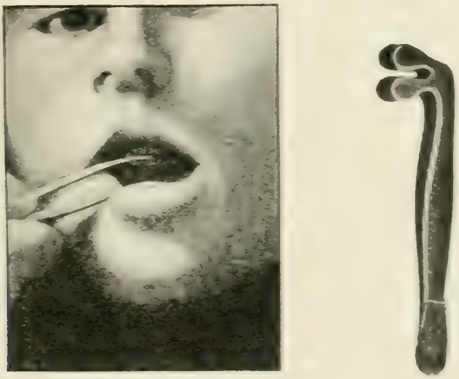
[2] Deutsche Zeitschrift für Chirurgie, March, 1899.

[3] Ibid.

TREATMENT is most unsatisfactory and usually fails to effect a cure. The persistence of the disease gives rise to grave apprehension because in some cases it is followed by cancer of the tongue. The patient should give up tobacco entirely, and should refrain from the use of irritating condiments, very sweet or very sour food, and very hot or very cold articles of diet.

Any jagged tooth should be filed smooth or removed. If the patient has had syphilis it is customary to give specific treatment, but I have never seen any benefit result from it. Strong caustics do harm. Painting the areas frequently with a 2 per cent. solution of chromic acid or with equal parts of alcohol and glycerin may do good. Tillmanns[1] occasionally uses the galvano-cautery, and excises circumscribed areas. Joseph Ransohoff[2] has apparently succeeded in curing several cases by the performance of an operation which he calls decortication. He operated successfully upon three cases and removed considerable areas of mucous membrane. In a case which progresses in spite of all treatment the operation is justifiable, but there is doubt as to how much mucous membrane it may be proper to remove.

FIG. 5.



Sutherland's speculum for operating upon tongue-tie.

Tongue-tie. In operating it is sometimes difficult to bring the parts into a satisfactory position for a safe operation. J. L. Sutherland[3] has devised a speculum which is most useful. The cut shows the instrument and the manner of using it (Fig. 5).

---

[1] Tillmanns' Text-book of Surgery.

[2] Annals of Surgery, May, [illegible]

[3] Journal of American Medical Association, April 29, [illegible]

Tongue-tie is a rare condition, and operation is hardly ever necessary. In some cases the tightened frænum can be loosened by tearing it with the thumb nail. If operation is really necessary, Sutherland's instrument will be a useful aid, but not an essential. The important point to remember in cutting the frænum is that the scissors should be directed toward the floor of the mouth, and the frænum should be divided near the floor of the mouth rather than near the tip of the tongue. Sutherland's instrument protects the vessels at the base of the tongue. The handle of a grooved director is made to answer the same purpose.

Cleft Palate. In PROGRESSIVE MEDICINE last year I reviewed some opinions upon cleft palate, and advocated the views of Edmund Owen as to the necessity for early operation. If a hare-lip exists this is closed first (from the third to the fourth month if the child is healthy). A cleft which involves the soft palate only can be operated on during the first year. A bony cleft should be operated on during the second year. Pierre Delbet[1] disagrees radically with Owen. Delbet opposes a very late or a very early operation, and prefers to operate between the sixth and seventh year. Owen maintains that if operation is delayed the patient forms the habit of speaking imperfectly—a habit which will not be cured by closing the gap. Owen's view is that this vicious speech habit should be prevented by early operation. Delbet opposes operation during the second or third year, believing that in these early operations there is a greater mortality and no better and possibly a worse functional result, because operations on the very young are extremely difficult, and in them the maxillary bone is apt to atrophy. I believe the phonetic result of early operations is better than that of late operations, and that the mortality will not be large if Owen's sagacious counsel is carefully followed. Owen returns to the charge in a recent article.[2] He says that the surgeon should carefully choose the time for operation. If the child is in ill-health, and if it is liable to cough, diarrhœa, or vomiting, postpone operation until the condition is improved. If the tongue is coated and foul, order change of air, regulate the diet, and administer a mixture of soda and rhubarb. Have the teeth carefully attended to by a dentist, and thus lessen the danger of infection of the suture line. Every carious tooth should either be cleaned and filled or drawn. During several days before operation the mouth and gums should be cleansed repeatedly with a saturated solution of boric acid mixed with glycerin. When there are enlarged tonsils or pharyngeal adenoids some surgeons operate on the palate first. Owen opposes this, and advocates operating on the adenoids and tonsils first.

---

[1] Leçons de Clinique Chirurgicale.

[2] British Medical Journal, November 5, 1898.

He says the child is accustomed to breathing through a large cleft in the palate. If this gap is closed suddenly serious trouble will ensue if the air channel is partially occluded by adenoids and enlarged tonsils, hence such growths should be gotten rid of first. Enlarged tonsils ought to be removed at least ten days before the palate is operated upon. If during the operation upon the tonsils a septic area or a tubercular focus is opened into, the operation on the palate should be delayed for considerably more than ten days.

Immediately before operating on the palate the child must be given an enema of beef-tea and brandy. Owen approves of chloroform as an anæsthetic, but does not approve of keeping the child deeply under its influence. A silk suture is passed through the tip of the tongue, the tongue is drawn forward, and the gag is inserted. The head should be hung over the end of the table so that the blood will not pass into the larynx. I have operated with the patient semierect. In this position the blood may possibly run into the lower air passages, and I prefer to use the Trendelenburg position, especially if chloroform is employed as an anæsthetic, because the semierect position is dangerous in chloroform anæsthesia. The Trendelenburg position causes the blood to flow away from the larynx and trachea. Owen directs us to thoroughly pare the edges of the cleft, and to make an incision on each side by the inner portion of the alveolar process, and to arrest bleeding by pressure. The raspatory is used to raise the mucoperiosteal flaps. Test the flaps to see if they can be approximated without tension, and, if they cannot, carry the lateral incisions into the soft palate and divide the levator and tensor palati and the palatopharyngeus muscles. Divide the attachment of the aponeurosis of the velum to the posterior border of the hard palate. Insert sutures of silver wire by means of a modified Smith's needle. Sometimes the silver wire sutures are re-enforced by sutures of horse-hair. After fastening the sutures the lateral incisions gap widely. It is of the first importance that the suture line be free from tension. The child is put to bed with the head slightly raised and with the face turned to the side on the pillow.

If staphylococci infect the wound the operation will be spoiled. In such a case, in a fortnight after the first operation, Owen operated again and secured a good result. He believes that the first infection established an immunity. If this be true, in every such case the prompt performance of the second operation is advisable.

The Surgical Section of the American Medical Association, June 9, 1899, debated the technique of cleft palate operations. McCurdy advocated placing the patient in what he called Murphy's position, which Ochsner said was really the Rose position (the head is brought over the end of the table and dropped to a right angle with the spine). McCurdy said that a very small needle should be used, but a cervix needle will do. McCurdy's own needle has a hook to remove the suture. His self-retaining mouth-gag and tongue depressor enable the surgeon to dispense with two assistants.

Dr. Vance said, and I agree with him, that in severe cases it is often best not to interfere surgically. Such a case should have a diaphragm made by a dentist. Dr. Ricketts has made a like statement. Ochsner said that as a rule the operation gives better results than the obturator. He insisted on the importance of teaching these children to talk properly.

Nævæ. TREATMENT. The majority of nævæ should be treated by excision, which should always be carried out when possible. If a nævus is very large it may not be proper to excise it in an infant, because of the large loss of blood which is inevitable. It may not be proper to excise a large nævus if it is evident that the wound cannot be closed, although in these cases it is usually possible to cover the wound by swinging flaps into place or by employing skin-grafting. When a nævus is partially superficial and partly deep, involving structures which cannot be readily removed, such as the lip, or even more important deeper structures, then excision is not advisable, and in these cases other methods must be employed. Of these, Cheyne and Burghard describe two—namely, (1) electrolysis and (2) injection.[1] Electrolysis is to be preferred to injection. The local effect is to be produced by the positive pole. Cheyne and Burghard say that several needles are attached to the positive pole and inserted into the nævus. These needles are insulated up to a quarter of an inch of their points, and they are inserted so that the insulated portion is within the skin. These authors tell us that the needles must not approach too near the surface of the tumor, skin, or mucous membrane, because sloughing may ensue. The needles must be kept parallel to each other. Before using the needles they should be rendered sterile by boiling. After the needles have been inserted "a large flat pad attached to the negative pole and moistened with salt solution is placed on the skin either over the spine or somewhere in the neighborhood of the nævus," and the pad is moved from time to time during the electrolysis, so that it does not act too long at one spot. If left too long in one spot sloughing may ensue. Cheyne and Burghard say that in a large nævus both poles may be attached to needles and pushed into the tumor. The proper current-strength, they tell us, is from forty to eighty milliampères, and the current is passed for about ten minutes, when the nævus is felt to be getting firm. An important direction is to reverse the current for a few seconds before withdrawing the needles. If this is not done the tissues adhere to the positive pole, and on withdrawing the needle bleeding may occur. Electrolysis causes much pain, and it is often well to give an anæsthetic before employing it. The current should be gradually increased and gradually diminished. One application will rarely cure a large nævus, and three or four sittings may be necessary. After the first sitting wait until the induration disappears before using the electrolysis again. Cheyne and Burghard insist on antiseptic preparation of the surface before operating. After operating the punctures are covered with salicylic wool, held in place by collodion.[1]

---

[1] A Manual of Surgical Treatment, by W. Watson Cheyne and F. F. Burghard.

SURGICAL OPERATIONS ABOUT THE CHEST.

Tumors of the Walls of the Chest. Malignant tumors sometimes grow from the bony walls of the thorax. Paget says that secondary malignant tumors of the ribs and sternum are very rare. I have, in several cases of carcinoma of the breast, found the ribs extensively involved, and in two cases have observed that the sternum was infiltrated. In such cases radical operation is out of the question. Primary tumors of the bony walls occasionally occur. Paget says that fibroma, osteoma, and hydatid disease are extremely rare, but enchondroma and sarcoma are more common. The most common tumor met with in this region is chondrosarcoma, but pure chondroma is sometimes found near the cartilage of a rib, and pure central sarcoma is met with in the sternum. Operative removal of malignant growths is sometimes impossible and is often very difficult, and in any case the pleura is apt to be opened and the lung or diaphragm may be involved. If the pleura is widely opened there occurs a sudden and dangerous pneumothorax.

F. W. Parham recently reviewed this subject in a most instructive article.[2] Parham's conclusions are of great practical value. He shows that in tumors of the chest-wall it is advisable to operate early, the earlier the better, because by delay a chondroma may become a sarcoma, and early in the case the pleura is far less apt to be involved than later. The author believes that the X-rays "are destined to render much valuable service" in making a study of such tumors.

Parham follows the views of Mikulicz as to the necessity of estimating the percentage of hæmoglobin in studying such cases. Mikulicz believes that very low hæmoglobin points to malignancy, and that a marked fall some time after the removal of a malignant tumor points to recurrence. It is rarely advisable to remove secondary tumors of the chest-wall. Such an operation cannot bring about a cure, and may be most formidable. I have several times removed portions of infiltrated ribs in operations for carcinoma of the breast, and consider that if the invasion is not too extensive the operation is justifiable. In one such case, while removing a rib, the infiltrated pleura was opened, an accident followed by pneumothorax, shock, and death. It would have been wiser to have refrained from operating. Many primary tumors are susceptible of efficient removal. Parham says if "a tumor is demonstrably primary in character and there be reasons for believing that it has invaded no structure which cannot be removed, then an operation is indicated, and may be done if the condition of the patient shall justify it." If in the operation the pleural cavity is extensively opened pneumothorax almost certainly arises, and in some cases this is most dangerous, producing, as it does, serious pressure upon vital structures, bending of the great vessels, and disastrous reflex effects. Possibly, as Dr. Murphy suggests, "the vibration of the mediastinal septum and contents" destroys the piston-action of the diaphragm. Parham says that many suggestions have been made as to the prevention of pneumothorax. He thinks most highly of the Fell-O'Dwyer apparatus for forced respiration, and says that no surgeon should attempt thoracic resection without having this apparatus at hand.

---

[1] A Manual of Surgical Treatment, by W. Watson Cheyne and F. F. Burghard.

[2] Thoracic Resection for Tumors Growing from the Bony Wall of the Chest. Read at the Southern Surgical and Gynecological Association, November, 1898.

Rudolph Matas, in a most important paper read before the Louisiana State Medical Society,[1] asserted "that the most promising procedure in preventing pulmonary collapse in operations on the chest is the artificial inflation of the lung and the rhythmical maintenance of artificial respiration by a tube in the glottis directly connected with a bellows." Dr. Fell, of Buffalo, first used this principle on man, and maintained respiration by means of his apparatus in a case of opium-poisoning. Fell did tracheotomy, inserted a tracheotomy canula, and attached to the canula the hose of the bellows. O'Dwyer substituted an intubation-tube for a tracheotomy canula (Rudolph Matas). The apparatus thus modified is called the Fell-O'Dwyer apparatus. The laryngeal canula is so constructed that "one branch receives the ingoing air from the bellows and tube; the other branch, stopped with the operator's thumb (which is to act as a valve), serves for the exit of the air" (Rudolph Matas). By means of this apparatus artificial respiration can be kept up for an indefinite period.

Parham has used the Fell-O'Dwyer apparatus with great satisfaction in operations involving extensive thoracic resection with opening of the pleura. If the pleura is opened the apparatus should be used. In one of Parham's cases the apparatus was used until the completion of the removal of the tumor, when the lung was sutured to the margin of the opening with a continuous suture of catgut. After suturing, the lung did not tend to collapse, and the apparatus was withdrawn (F. W. Parham's paper).

---

[1] Transactions of Louisiana State Medical Society, 1898.

Empyema. The TREATMENT of empyema is always purely surgical, and those rare recorded cases in which empyemata have recovered spontaneously should not influence this positive view. An operation should be performed early. To delay operation, even if things do as well as possible, is to wait until dense adhesions form and great thickening of the pleura occurs—conditions which prevent lung expansion and militate strongly against permanent cure. To delay in these cases may be very dangerous. Anyone with pus in the pleura is in peril, and will almost surely die in the long run if operation is not performed (from septicæmia, pericarditis, pleuritis, or rupture into a bronchus).

Aspiration is not employed to effect a cure. Such a procedure might cure a small pneumococcus empyema in a child, but will not cure empyemata produced by other infections ; it will not cure an extensive empyema, and will very rarely cure an empyema in an adult. Aspiration is useful diagnostically, and may also be employed to partly empty a large empyema before giving an anæsthetic and performing a more radical operation. If a man with empyema suffers from dyspnœa and is aiding respiration by his voluntary muscles, an anæsthetic will abolish the action of the voluntary muscles, respiration will cease, and it will be " almost impossible to restore it with one side full of pus."[1] In such a case always aspirate before doing a radical operation.

I cordially agree with Lockwood that a diagnostic aspiration is advisable, first, to prove that empyema exists ; second, to enable us to determine by an examination of the pus what form of organism is responsible for the infection. Lockwood has pointed out that if a tubercular empyema is present in a young person who has active phthisis radical operation is contraindicated, as it would probably prove fatal. If, however, the phthisis is not actively progressive, and especially if the patient is an adult, a radical operation is justifiable. In all other infections operation is indicated.

The results of operation are not always satisfactory. Results are better in children than in adults. In many cases a discharge continues for long periods after the operation, and eventually the patients die of phthisis or amyloid disease, or have to be subjected to the formidable operation of Schede or Estlander.

" Even in cases described as cured we find, certainly, the discharge stopped, but how seldom do we find complete restoration of function. I have examined many of these cases up to nine years after the date of supposed cure, and hardly in one has the cure been complete. Nearly always is there more or less incomplete expansion on the affected side. The longer a case takes to heal the more incomplete will be the cure, as the pleural membrane will be the thicker and the falling in of the chest-wall the greater. Our treatment, therefore, must be less expectant and more active in bringing about rapid healing by getting the lung to expand quickly." [1]

---

[1] W. Menzies Hutton, in British Medical Journal, October 29, 1898.

Good drainage must be obtained. In some children intercostal drainage is often satisfactory, but in many children and in all adults a portion of a rib should be resected. In some cases, after incision, adhesions should be broken up with the hand (Lamphear). After an incision has been made the pus does not run out purely by gravity, but is forced out by the expansion of the lung, and the pus cavity is finally obliterated when the lung expands completely. Hutton points out the importance of remembering the method by which the lung expands.

" It does so by the various expiratory acts—for example, coughing. When an opening exists through the chest-wall the respiratory acts are reversed—that is, with inspiration the lung collapses still more, with expiration it expands. During inspiration the healthy lung expands, and draws air in by the mouth and also out of the collapsed lung ; with expiration, especially coughing, the healthy lung drives air into the collapsed lung and expands it. This is easily seen after opening the pleural cavity, when, if the patient coughs, the pus is violently ejected, while with inspiration the flow may stop.

" In treatment we must provide for exit of the pus, and at the same time aid the expansion of the lung. The method of incision and drainage now usually adopted provides for the exit of pus, but only accidentally aids the expansion of the lung, in so far that when the dressing becomes soaked it will, with inspiration, be sucked against the opening and to some extent prevent the ingress of air into the pleural cavity. This is sometimes seen in acute cases—for example, after pneumonia in which rapid expansion may occur. Here we are in the habit of removing about an inch of rib to allow more room for the tube, should healing be delayed. If we can aid the expansion of the lung this step will not be necessary, and will thus materially shorten an operation which is always an anxious one." [2]

Many surgeons advocate resection of a portion of the seventh or eighth rib. Munro[3] advocates resection of one of these ribs, believing that at this level there is no danger of injuring the diaphragm, and that the drainage will be good. He removes the ribs in the anterior or mid-axillary line. Hutton maintains, with good reason, that the opening should be in the line of the sixth rib in the mid-axillary line. His reasons are: 1. This is the last portion of the lung to expand. If an incision is made anterior to this, or posterior at the angle of the scapula, as the lung expands it blocks the drainage opening and an undrained pus cavity will remain toward the axilla. 2. An incision so placed is most comfortable for the patient, because when he lies upon his back the drainage-tube will not be pressed upon.

---

[1] W. Menzies Hutton, in British Medical Journal, October 29, 1898. [2] Ibid.

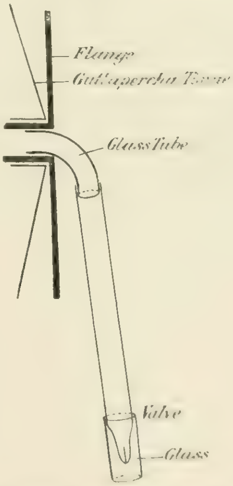
[3] Medical News, September 2, 189

The operation can be performed with the patient at the edge of the table and resting on his back or on the diseased side, but never on the sound side. If we place him on the active side respiration will always be greatly interfered with and will in some cases be arrested. Munro places the patient in a partly sitting position, with the arm of the diseased side held over the head.

In most cases a general anæsthetic can be given. If the empyema is very large and the patient is using his voluntary muscles of respiration, aspirate before giving the anæsthetic or do the operation under local anæsthesia. I have operated several times with the tissues under the influence of eucaine, and the pain has not been severe. In double empyema a general anæsthetic should not, as a rule, be given, although Cooke gave A. C. E. mixture in a recently reported case.[1] In double empyema both sides can be operated on the same day, but it is usually wiser to delay operating on the other side for several days or a week. In empyema operations many surgeons employ chloroform. I have generally used ether, and have found it perfectly satisfactory. After an operation the expansion of the lung is favored by respiratory exercise, and particularly by having the patient frequently blow into the tube of a wash-bottle containing water, the forcible blowing projecting the water from a second tube. The patient should be allowed to sit up as soon as it is safe.[2]

Hutton[3] has devised a method which he claims allows the pus to escape and aids the lung to expand. I have had no personal experience with it. His apparatus contains a duck-bill valve, and is shown in Fig. 6.

FIG. 6.



Hutton's apparatus for draining an empyema.

He claims that as a rule when his method is employed the lung expands in about eight days, and asserts that it obviates the danger of mixed infection which is not small when the tube is used. This apparatus is not to be employed, he tells us, if there is an opening in the lung. In such cases ordinary drainage is to be used until the pulmonary opening closes, and then valvular is substituted for tubular drainage. He describes his apparatus as follows :

---

[1] Lancet, October 1, 1898.
[2] John C. Munro, Medical News, September 2, 1899.
[3] British Medical Journal, October 29, 1898.

"It consists of a large-sized drainage-tube with a flange of rubber five inches long by four broad ; next there is a piece of tubing to which the valve is attached. The valve consists of a gutta-percha nipple slit at the end, and is enclosed by a piece of glass tubing to protect it from pressure. The tube with the valve is attached to the flange-tube by a right-angled piece of glass. The apparatus is used thus : After the chest is opened the flange-tube is cut just long enough to go through the chest-wall only, a piece of gutta-percha tissue being interposed between the skin and the flange ; this when wet adheres to the flange and skin, thus preventing air getting in by the side of the tube.

"Some wool is next applied over the flange, which is fixed to the chest by a domette bandage. The tube with the valve lies across the abdomen, the valve surrounded with wool and fixed by a binder. If all is rightly applied it will be seen that when the patient coughs air is expelled with the pus, and when inspiration occurs the lips of the valve close tightly and prevent the ingress of air. No air or discharge should escape by the side of the flange ; if it does so, the bandage must be tightened or a turn or two of elastic webbing bandage must be applied."[1]

The MORTALITY of empyema is considerable, and is greater in children than in adults. Cantley's figures indicate that in children the death-rate is 16.6 per cent. In children under three years of age the mortality has been 50 per cent. The chief causes of death after operation, according to Munro, are pneumonia, general infection, or dislodgement of an embolus.[2] In a chronic empyema it is usually necessary to resect a number of ribs by the method of Schede or Estlander, although Estlander cured a case of sixteen months' duration by the use of siphon drainage. In some cases even extensive rib resection fails. In such a case Pascale effected a cure by separating the indurated pleura from the lung, cutting it loose with a knife. Schede's operation is to be preferred to Estlander's in pleural fistula, because it enables us to remove a great amount of thickened parietal pleura.

DOUBLE EMPYEMA is a very rare and extremely fatal condition. Many writers advise against operating in these cases unless it is necessary to evacuate the pus to prevent asphyxia. As previously stated, I believe it is wise to operate on one side, and after a week has passed to operate on the other side. This is the view of Treves. Treves further says: "It is a striking and apparently a paradoxical fact, that an operation (opening both pleuræ) which if performed on the healthy would be invariably fatal in its effects is a valuable means of saving life when employed in conditions of disease."[1] W. H. Cooke[2] has reported a case of double empyema in a girl, aged eleven years. The left side was incised through the ninth interspace, and a tube was inserted. Five days later a like operation was performed on the right side. In both operations the A. C. E. mixture was given, and there were no unfavorable symptoms during its administration. The patient recovered.

---

[1] British Medical Journal, October 29, 1898.

[2] Medical News, September 2, 1899.

Pneumothorax. DIAGNOSIS. In most cases of this rare disease the physical signs are characteristic. In some cases, however, they may be misleading, when, for instance, the percussion-note is dull. Dr. Osler says he has several times known an error in diagnosis to result from ignorance of the fact that in some cases the percussion-note is, to quote Walshe, "muffled, toneless, almost dull." In such a case any promising diagnostic aid should be utilized. It is claimed that the X-rays furnish this aid. L. Stembo[3] makes a report on the use of the X-rays in the diagnosis of pneumothorax. He says in such a case we find that the skiagraph possesses certain characteristics, viz.: 1. Striking clearness where the air is found. 2. A dark spot due to exudate below the clear zone. 3. The upper border of the dark zone rises and falls with respiration. 4. This dark border may move in a wave-like manner under the influence of rapid respiration, alterations of posture, coughing, and, on the left side, cardiac pulsations.

Pure pneumothorax is an extremely rare condition, and what we call pneumothorax is usually associated with fluid. If the fluid is serous the condition is called hydropneumothorax. If the fluid is purulent the patient is said to labor under pyopneumothorax.

Empyema necessitatus is an empyema pointing on the cutaneous surface. Galliard[4] writes on pyopneumothorax of necessity. He defines the condition as a cold abscess of the chest-wall, which contains gas as well as purulent matter, and which complicates a pyopneumothorax. He reminds us that a gaseous abscess of the chest-wall is usually of pulmonary origin; hence, if such an abscess is discovered, the physician must think of pulmonary actinomycosis, tuberculosis, and gangrene as possible causes. If these conditions can be ruled out the suggestion which should occur to the mind is pyopneumothorax. Galliard says, and wisely, that the surgeon must not wait for the abscess to evacuate spontaneously. This rule is especially important if the pus is putrid. In an abscess complicating a partial pyopneumothorax Galliard incises the abscess directly, and at a later period makes a free incision into the pleura through the intercostal space containing the fistula, and inserts drainage. If the pyopneumothorax is general he does not incise the pus pocket, but at once opens the pleura at its lower margin (inferior pleurotomy). After the performance of inferior pleurotomy he claims that the abscess will disappear.

---

[1] Quoted by W. H. Cooke, Lancet, October 1, 1898.

[2] Ibid.

[3] Deutsche medicinische Wochenschrift, July 13, 1899.

[4] Semaine Médicale, February 8, 1899.

Foreign Bodies in the Bronchi. The entrance of a foreign body into a bronchus is by no means a rare accident, and it "is one of the most serious accidents which can befall a man." [1] Such an accident occurs by the foreign body being drawn in from the mouth or a tracheotomy wound during inspiration. Dr. George B. Wood has recently discussed in a valuable article the subject of foreign bodies in the lungs.[2] He says if foreign bodies are drawn into the bronchi during respiration the condition ensuing, in the lodgement of such a body, presents the following peculiarities: Traumatism is absent or is very slight; there is usually stoppage of a bronchus or bronchiole, and in consequence the lung cannot functionate normally; if pus forms it is readily taken to different parts of the lung through the bronchial tubes; the foreign body is often easily loosened and coughed up. He contrasts these conditions with those which ensue on the entry of a foreign body into the lung by perforation of the chest-wall—an accident in which traumatism plays a most important rôle. In some few instances an individual has lived for years with a foreign body lodged in the bronchi. Wood shows that in fifty-three cases of complete recovery there were three in which the body remained lodged in the bronchus. In some cases the foreign body has been coughed up.

My impression has always been that such good fortune is rarely obtained. Curtis says there are some cases on record in which the body returned by the route of entry.[3] Wood[4] shows that the tendency is actually toward spontaneous expulsion. He has collected from German and English literature, dating from 1878 to 1897, eighty-nine cases of foreign bodies which entered through the upper air-passages, and in fifty-one of these cases spontaneous expulsion took place. In most cases, if the body is not ejected spontaneously or is not removed by operation, death occurs. Weist estimates the mortality caused by foreign bodies in the air-passages (including the upper air-passages) if the cases are untreated at 29 per cent. Preobraschensky estimates the mortality from foreign bodies in the bronchi at 55 per cent. Wood estimates the mortality from foreign bodies in the bronchi at 34 per cent. Out of the eighty-nine cases in Wood's table there were fifty-three complete recoveries, five convalescents, one in which the result is not given, and thirty deaths. Wood's studies and experiments lead him to conclude that if a foreign body is retained it rarely becomes encapsuled, and usually leads to destructive changes, although it does not particularly predispose to phthisis. He has proved experimentally that encapsulation may take place, but it rarely does so. It requires a long time to accomplish encapsulation, because of the scanty supply of fibrous tissue. The same author says that after a foreign body has been expelled or removed the lung tissue tends to rapidly heal and recuperate. If a body remains impacted in a bronchus pyogenic infection is apt to occur, and this may be followed by abscess or gangrene. Most writers say that phthisis may follow. Wood's experiments indicate that phthisis rarely follows. We would infer this also from the fact that even in a case of so-called phthisis following the impaction of a foreign body the patient usually quickly recovers if the foreign body is removed. Wood thinks that pyogenic infection is often mistaken for tubercular disease.

---

[1] B. Farquhar Curtis, on Posterior Thoracotomy for Foreign Body in the Right Bronchus, Annals of Surgery, November, 1898.

[2] George B. Wood, on Pathology of Foreign Bodies in the Lungs, in Philadelphia Monthly Medical Journal, June, 1899.

[3] Curtis, in Annals of Surgery, November, 1898.

[4] Philadelphia Monthly Medical Journal, June, 1899.

TREATMENT. How should we treat a patient suffering from lodgement of a foreign body in a bronchus or bronchiole? Until recently it was thought that the only resource is the performance of a low tracheotomy and the extraction of the body through the tracheotomy wound by means of forceps, or, if this fails, keeping the tracheotomy wound open by stitching, and waiting in the hope that the body will eventually be expelled. Many cases are on record in which the body has been removed by forceps used through a tracheotomy wound. I have seen two such cases. In one case, in which I assisted Dr. Hearn, the foreign body could not be found through the tracheotomy wound, but later was expelled through this wound, which had been kept open in hope of such an occurrence. W. A. Moffat has recently recorded the case of a child in whose right bronchus a cartridge lodged. The X-rays showed the foreign body, and a low tracheotomy was performed under chloroform. The cartridge was felt by inserting a stout piece of silver wire, blunt at the point, and was extracted by means of nasal polypus forceps having a crocodile mouth. During the manipulations within the bronchus the patient coughed violently.[1] Killian[2] advocates the employment of direct bronchoscopy in such cases. In one case he performed tracheotomy, inserted the bronchoscope through the wound, discovered a bean, and removed it. In another case he inserted the instrument into one of the bronchi from the mouth. In the latter case the foreign body was found to have disappeared, although an area of granulation tissue was seen at the point where the body had been lodged. In 1895, Joseph D. Bryant suggested that the bronchus might be reached by resecting the ribs posteriorly and thus opening the chest (similar to Nasiloff's operation for reaching the œsophagus). The first attempt to put Bryant's suggestion into practice was made by B. Farquhar Curtis in 1898.[1] Curtis' patient was a boy, eleven years of age. Three days before admission he was holding in his mouth the seed-vessel of a plant through which a pin had been passed. By a deep inspiration he accidentally drew the body into the right bronchus. The fourth day after the accident a low tracheotomy was performed. Forceps located the foreign body about two inches beyond the bifurcation, but attempts at extraction proved futile. It was evident that the point of the pin was directed upward and was caught in the wall of the bronchus. The next day posterior bronchotomy was decided upon as the proper procedure. A quadrangular flap was raised from the posterior aspect of the chest. The base of this flap was outward at the scapula, and the free edge was near the spines of the fourth, fifth, and sixth dorsal vertebræ. After the ribs were exposed portions about three inches in length were resected subperiosteally from the fourth, fifth, and sixth ribs. The pleura was exposed and separated "from the contents of the posterior mediastinum and from the posterior chest-wall, so as to give access to the root of the lung." The bronchus was reached. It was found difficult to expose, because the azygos vein crossed it. The patient's condition became so serious that the wound was packed with gauze and the operation temporarily abandoned. The next day another attempt was made. The bronchus was opened without hemorrhage. It was found impossible to recognize the partly macerated foreign body with the forceps; but pressure upon the lungs with the fingers finally enabled Curtis to locate it. The parietal pleura was sutured to the surface of the lung, the ends of the sutures being left long so as to enable the surgeon to hold the lung. An incision was made with a cautery knife, and through this opening the foreign body could be felt, though it still eluded the forceps. The condition of the patient became so bad that the operation was abandoned. The patient died of pneumonia forty-eight hours after the last operation. The necropsy showed that the foreign body lay in one of the secondary bronchi, the pin having penetrated the bronchial wall.

---

[1] W. A. Moffat, in British Medical Journal, March 4, 1899.

[2] Münchener medicinische Wochenschrift, May 30, 1899.

Curtis' efforts in this case were truly heroic. His report shows that it is possible to open the bronchus without wounding the pleura or azygos vein. If the body had been blunt and larger he would surely have extracted it. Curtis believes that the pneumonia resulted from the impaction of the foreign body rather than from the operation. He says in another case he would make efforts to reach the foreign body through the tracheotomy wound for a short time only, and if they failed he would at once perform the posterior operation.[1]

---

[1] Annals of Surgery, November, 1898.

Penetrating Wounds of the Thorax. When a sharp instrument wounds the lung there is usually violent hemorrhage. The bleeding may be from the vessels of the lung, from the internal mammary artery, or from an intercostal artery.

Matas[2] insists that every wound of the chest in which there are serious symptoms should be carefully examined for injury to the internal mammary and intercostal vessels. I do not think these vessels are very often injured. Dr. Robert Le Conte[3] states that he has never been able to demonstrate that an intercostal artery was cut. He has never seen it spurt, and infers from its situation below and behind the lower border of the rib that it is not often injured unless the rib itself is damaged. Matas says that "bleeding from these vessels is frequently overlooked, because it is often concealed and internal." He has had "two cases of stab wounds of the internal mammary artery and one of the intercostal. The two mammary injuries ended fatally. In one of these, at least, a careful and thorough examination would have probably averted the fatal end."[4] Undoubtedly, as Matas says, experience shows the necessity for prompt and careful investigation of all deep wounds in the region of these vessels. A case has been recently recorded[5] in which a man bled to death from a stab wound involving an intercostal artery. At each expiration aspiration of blood took place from the divided artery and a clot could not form. The bleeding took place into the pleura. Matas further most wisely says: "In conditions of great exhaustion, and where there is doubt that bleeding is actually going on, it may be sufficient to plug the wound with a Desault's bag or tampon, which can be aptly compared to a small Mikulicz's bag, thoroughly packed so as to compress the wounded vessels. But when the situation does not improve and there is evidence that bleeding is going on, the quickest and surest treatment is to enlarge the wound (in extreme exhaustion with cocaine anæsthesia as a help) and expose the intercostal or internal mammary. With the help of a rongeur or a sharp costotome this work can be done quickly. The subperiosteal resection of a rib is so certain to expose the bleeding vessel, and is so easily accomplished that there is no excuse for delay in critical conditions when the patient's life hangs in the balance."

---

[1] Annals of Surgery, November, 1898.

[2] Transactions of Louisiana State Medical Society, 1898.

[3] Annals of Surgery, April, 1899.

[4] Rudolph Matas, in Proceedings of Louisiana State Medical Society.

[5] Beiträge zur klinische Chirurgie, xxii., 2.

In fact, all stab wounds of the chest, whether they enter the lung or not, should be enlarged, layer by layer, to the depths. The puncture is thus converted into an open wound which is to be carefully disinfected (Burckhardt). Such a course is very necessary, because practically all stab wounds are inflicted by infected tools or weapons. Burckhardt shows that the mortality is much greater if incision and disinfection are omitted.

If the source of serious bleeding is from the lung, what shall be done? Great differences of opinion exist. Where a man seems certain to die if the hemorrhage is not promptly arrested, two or more ribs should be resected, the source of the bleeding should be located, and the vessel or vessels should be ligated if possible (Omboni). If it is not possible to ligate it may be possible to suture (Delorme, Ferraresi). In some cases the pulmonary wound can be packed with gauze (Michaux, Quénu). In other cases it may be necessary to fill the pleural sac around the lung with gauze to give a base of support, the hemorrhage being arrested by packing applied against the supported lung (Da Costa). In performing any one of these formidable operations, Rudolph Matas tells us to bear in mind the value of intravenous saline transfusion in combating shock and of the Fell-O'Dwyer apparatus in preventing collapse of the lung.

Le Conte[1] discusses the relative merits of closure of the external wound and the insertion of a drainage-tube in the treatment of pulmonary hemorrhage due to stab wound. He advocates the employment of the latter method, and would reserve the formidable operations set forth above for cases in which artificial pneumothorax failed to stop the hemorrhage. Many surgeons have advocated simple closure of the external wound in such cases, because they believe that as the blood gathers in the pleural sac it will make mechanical pressure upon the lung and eventually arrest the bleeding.

Le Conte admits that many cases have recovered under this plan of treatment, but he does not think that the bleeding stops because of increase of intrapleural pressure.

" In the first place the pressure in a lung on forced inspiration is equivalent to about thirty millimetres of mercury, and at expiration its pressure is a negative one of from six to ten millimetres of mercury—in other words, the tendency for the elastic tissue of the lung to still further contract at expiration is equivalent to from six to ten millimetres of mercury. By strapping the chest one endeavors to prevent the respiratory muscles from acting and to keep the lung in a position of expiration, one in which the intrapleural pressure is negative instead of positive. To be sure, the capacity of the chest is diminished, but it will still be large enough to hold a quart or two of blood before any very considerable pressure will be exerted on the lung. Secondly, when blood is poured into the pleura and the air is excluded there is little or no tendency for it to clot, and it frequently remains fluid for days or even weeks. Therefore, the chances of the cut vessels closing by clot are materially decreased. Thirdly, as the mechanical pressure from the effused blood increases and forces the lung back against its root, it must materially affect the circulation of blood through the lung, and so engorge the right side of the heart and raise the blood-pressure. Therefore, as the mechanical pressure increases the blood-pressure rises also, and the severed vessels remaining patulous, the gain from the outside pressure is in a measure overcome by the increased pressure within the vessels." Le Conte said in a measure, for the loss of blood would tend to decrease the blood-pressure. By the application of ice to the chest only a very slight effect can be exerted on the lung, and the exhibition of drugs he believed to be useless, and of ergot to be rather harmful. "Now, when such a case recovers it does so with a pleura filled with blood. If the blood remains fluid it may be easily aspirated and no harm result. But if clotting takes place before aspiration is tried, a rather formidable operation would be required to remove the clots, and if they are allowed to remain, organization will take place, the pleural cavity will be obliterated, and the lung tightly glued to the chest-wall, a condition which certainly impairs the usefulness of the organ and renders it more vulnerable to disease.

---

[1] Annals of Surgery, April, 1899.

"In a case in which a bronchus has been opened in addition to a severing of the vessels of the lung, and in which the external wound has been sealed, the hemorrhage will be much more rapidly controlled, owing to the mechanical pressure of the pneumothorax on the lung, and the blood will readily clot in the presence of air—an ideal condition for the rapid control of hemorrhage. But the patient is subjected to the risk of having this mass of blood-clot infected through the open bronchus and changing a hæmothorax into a pyothorax. This risk is a very serious one, and one not to be incurred with the hope and a prayer that infection will not take place. Also, by closing the external wound the chances of a general emphysema taking place are vastly increased, a complication which is annoying and may be serious.

"In cases where a drainage-tube is inserted into the pleural cavity and free drainage established, the pleura is immediately filled with air and the muscles of respiration are prevented from acting on the lung, allowing the lung to contract by its own elastic tissue as well as by the pressure exerted by the pneumothorax, and at the same time the presence of the air favors clotting in the severed vessels." In his limited experience, Le Conte said, this simple procedure had been quite sufficient to stop the hemorrhage. In addition, the drainage has cleared the pleura of blood, and if any infecting material has been carried in it has reduced its dangers to the minimum.[1]

Gunshot Wounds of the Thorax. It is rarely that a bullet lodges directly in the lung-substance. George B. Wood notes this fact in his analysis of forty-three cases.[2] The same observer shows that a projectile often passes through the soft lung-tissue and lodges in the chest-wall. The mortality from these injuries is extremely large. Many cases die quickly after the injury from shock or hemorrhage; others die at a later period from septicæmia, abscess, pneumonia, empyema, pericarditis, etc. Klett[3] estimates the mortality from gunshot wounds of the thorax at 27.5 per cent. The mortality in the Civil War was 62.5 per cent. (Otis). Rudolph Matas, in a previously quoted article, points out the cause of the great divergence of view among some military men as to the mortality of such injuries in war. He cites as an example of this difference of opinion the fact that Fischer, at Metz, estimated the mortality of such injuries among the Prussians at 50 per cent. Billroth and Socin estimated the mortality from cases in the station hospitals at 28 per cent. Matas says that such discrepancies confirm the observations of Longmore and De Santi, " that the reported mortality of these wounds . . . will vary according to the distance which separates the field hospitals from the scene of action and the first line of relief, the statistics improving progressively as the wounded survive the transportation to greater distances." Matas further says that the improvement is not due to the fact that the treatment is better in the division hospital, but is due to the fact that the division hospital is further off and many of the mortally wounded die before they reach it and do not count in the statistics.[4] A gunshot wound is not apt to be an infected wound unless a bit of clothing or other foreign body is carried in with the bullet. The modern small calibre steel-jacketed projectile very rarely carries in any foreign body with it, and inflicts an aseptic wound. The wound is punctured rather than lacerated, but little tissue is devitalized, and such wounds tend to heal quickly.[5] Out of eleven cases of penetrating wound of the lung recorded by Campbell only two were infected. Senn considers that a patient has a better chance for life if a bullet passes through the chest than if it lodges. The same distinguished surgeon believes that the small modern bullet is productive of less danger than are older bullets of large calibre. The small, hard, jacketed projectile is apt to pass through the chest. La Garde points out that whereas the black powder formerly used may convey infection, the modern smokeless powder contains substances which inhibit the growth of micro-organisms. Senn, in speaking of the fight at Santiago, says that the number of those with chest wounds who lived long enough to reach the coast was amazing. He holds that injuries of the chest inflicted by Mauser bullets are not usually fatal, even if the lung is perforated. Unless there is profuse hemorrhage the symptoms are, comparatively speaking, slight.

---

[1] Le Conte, in Annals of Surgery, April, 1899.

[2] George B. Wood, on Pathology of Foreign Bodies in the Lungs, in Philadelphia Monthly Medical Journal, June, 1899.

[3] Deutsche Zeitschrift für Chirurgie, October, 1898.

[4] Rudolph Matas, on Surgery of the Chest, in Proceedings of Louisiana State Medical Society, 1898.

[5] William F. Campbell, in Medical News, November 5, 1898.

Francis A. Abbott, in an article upon surgery in the Græco-Turkish war,[1] says that such cases tend to get well. In a chest wound produced by a small-calibre modern bullet, unless the hemorrhage is severe, it is best to treat expectantly, simply asepticizing and dressing the outer wound or wounds. If profuse hemorrhage occurs the wound should be enlarged, and the surgeon should proceed as directed in the section on stab wounds of the chest. In a gunshot wound inflicted by the soft bullet of large calibre the surgeon should enlarge the wound and asepticize it, because the track of the bullet is probably infected.

A lodged bullet should be located by the Röntgen rays. The value of this method has been amply demonstrated in civil practice, in the Spanish-American war, in the Græco-Turkish war, and in South Africa. We lack information as to the ease with which a modern bullet becomes encysted, but it should not be removed if in a position where it is hard to reach, unless it is producing trouble or threatening harm. Encapsulation in the lung will certainly be rare. In George B. Wood's paper, out of the forty-three cases there was not one in which it was proved by necropsy or otherwise that encapsulation had taken place in the lung tissue.

Greenleaf,[2] in an article upon gunshot wounds of the chest, reports upon seventeen cases which occurred in the Spanish-American war. He says that the modern projectile is with some justice called humane, but a sufficient number of bad results follow injuries by it to modify the assertion to some degree.

Lucas Championnière treats gunshot wounds of the chest by abstaining from interfering with the wound, applying antiseptic dressings, and immobilizing the chest. He says even slight interference greatly adds to shock and may produce death. He does not employ auscultation, and lets the bullet take care of itself.[1]

---

[1] Lancet, January 14, 1899.

[2] New York Medical Journal, August 26, 1899.

Pulmonary Abscess and Gangrene of the Lung. The statement is frequently made that the diagnosis of abscess of the lung is an easy matter. Osler says that abscesses following pneumonia are easily recognized, but, on the other hand, embolic abscesses are not. In the diagnosis of pulmonary abscess careful attention should be given to the history, to the symptoms, to the physical signs, and to the microscopical and bacteriological examination of the sputum. It is necessary not only to diagnosticate the existence of abscess, but to accurately locate it. Physicians, as a rule, rely upon the physical signs to determine the location. The X-rays may be of great service.

D. S. Fairchild[2] calls attention to the fact that it is hard to differentiate between pneumonic abscess and an encysted empyema. This difficulty may be great if an abscess does not communicate with a bronchial tube, or if an empyema has broken into a bronchial tube, as in one of Fairchild's patients. In Fairchild's case there were no breath-sounds over the posterior surface of the right lung, and every morning quantities of pus were discharged through the bronchial tubes. It was noted that this pus was not offensive, as is the pus of pulmonary abscess, and that after it had flowed away there were no signs of a cavity. The aspirating trocar located pus. A rib was resected and an encysted empyema was found.[3] In an operation upon a supposed case of pulmonary abscess, in which I assisted, the condition was found to be bronchiectasis. In cases of doubt some surgeons introduce through the chest-wall a small, short, aspirating needle. I believe it to be safer and better to incise an intercostal space or resect a rib, and secure union of the two layers of pleura, if they are not already adherent, before making such a diagnostic puncture. If the puncture discovers no pus, exploratory pneumotomy with the cautery is proper. In some cases, to make a diagnosis, Tuffier performs rib resection, separates the parietal pleura from a considerable area of the chest-wall, and palpates the lung. Usually an indurated region can be detected if there is an abscess.

If a single circumscribed abscess of the lung is found to exist an operation must be performed. The accurate location of the abscess by physical signs is sometimes not accomplished. In a case in the Jefferson Medical College Hospital the physical signs were said to indicate an abscess in the lower lobe anteriorly, but Dr. Hearn subsequently found and drained an abscess in the lower lobe posteriorly. Carefully taken skiagraphs may be of great service in localization. In operating for an abscess, when the pleura is reached, the two surfaces over the abscess are usually gray and fibrous because they are adherent. If this condition is found the operation may be at once proceeded with. If the lung moves freely under the pleura adhesions are absent. When adhesions are absent it is thought best by most surgeons to postpone operation until adhesions are obtained. This postponement is advisable because it is almost certain that pneumotomy performed when there are no adhesions will be followed by pneumothorax, and also because there is great danger of infecting the pleura with the putrid pus of a lung abscess. Beck does not do the operation in two stages when the layers are not adherent, but employs great care. He opens the parietal layer of the pleura, packs iodoform gauze all around the opening under the parietal layer, and then proceeds to open the lung. The gauze is allowed to remain until adhesions form. Many surgeons suture the two layers together with catgut and postpone further operation for forty-eight hours. The suturing is not altogether easy, as the pleura tends to tear. Some few obtain adhesions by the application of irritants to the pleura. Quénu and Longuet,[1] as a preliminary to pneumotomy, suture the lung to the chest-wall. They divide the tissues down to the intercostal muscles, and then pass a curved and threaded needle close to a rib through the intercostal structures, the two layers of the pleura, and some pulmonary tissue. The suture is made to emerge, and the ends are tied over a rib. By this method it is claimed that the sutures will not tear or loosen.

---

[1] Bulletin de l'Académie de Médecine (Paris), May 16, 1899.

[2] Journal of American Medical Association, September 30, 1898.

[3] Ibid.

Ssapeshko says adhesions can be produced in from five to seven days by injecting into the pleural cavity five drops of a 2 per cent. solution of formalin.

It would be most advantageous to know before doing any operation whether adhesions exist or not. Dr. John B. Murphy has devised a procedure which will give us this important information. His method consists of gently injecting into the pleural cavity some sterile air. If there are no adhesions each inspiration will aspirate more air into the cavity. If adhesions exist respiratory sounds will not change, and dulness will remain. If adhesions do not exist the lung will finally collapse and respiratory sounds will cease.[2]

A method which appeals to me to be safer has been suggested by Ssapeshko.[3] He takes a blunt tubular needle without an eye and with an opening on the side near the tip and one at the end of the base. A rubber tube is fastened to the base of the needle, and the other end of the rubber tube is fixed to a glass tube with two branches, which is filled with fluid and is to be the manometer. A small incision is made in the skin, and the blunt end of the needle is pushed into the costal pleura, where it makes an odd sound. Pushing it still further, if there are no adhesions the opening in the needle enters the pleural cavity, fluid is at once aspirated into the needle, because of the negative pressure in the cavity, and fluid rises in the manometer. If the pleural surfaces are adherent there is no pleural cavity at this point, and the fluid in the manometer remains at the same level, although the end of the needle has been made to touch the lung.

---

[1] Rudolph Matas, on Surgery of the Chest.

[2] John B. Murphy, debate on Fairchild's paper.

[3] Revue de Chirurgie, July 10, 1899, from Lyetop, Russkoi Chirurgii, No. 1.

After the performance of pneumotomy for lung abscess a fistula may persist. Lichtenauer[1] has reported such a case in which he cured the fistula by an operation. The patient, a man, aged fifty-two years, had been kicked on the chest by a horse. An abscess formed some weeks later. The eighth and ninth ribs were resected, the two pleural surfaces were sutured, and the abscess cavity was incised. The cavity, which was found to open into a bronchus, was packed and drained. A fistula remained, which sometimes was open and which sometimes closed, and when it closed the patient developed serious symptoms. An incision was made and a very large cavity was found. At the first operation the pus cavity was the size of an egg. At the second operation the pus cavity was the size of a man's fist. The openings of the bronchial tubes into this cavity were touched with the actual cautery, and the cavity was firmly packed because of hemorrhage. Later the drainage became deficient, and another opening was made. After the third operation Lichtenauer applied elastic pressure to the chest in order to cause a progressive diminution of the thoracic space of the diseased side, and thus permit the contraction of the scar to obliterate the abscess cavity. At first the pressure was applied in the daytime only, but later it was used day and night. In one month the patient was cured. The author says that his case was an instance of acute gangrene complicated by bronchiectasis. The results of operations for bronchiectasis are usually very unfavorable. Lichtenauer quotes the statistics of Quincke and Tuffier. Quincke says that of five cases of simple bronchiectasis not one was cured, and in two of the operations the dilated bronchus was not even found. This trouble is usual in such operations, the patient expelling the pus because of cough during etherization, and the empty cavity being difficult to find. Tuffier states that seven out of forty-five cases of bronchiectasis were cured.

Pulmonary Tuberculosis. OPERATIONS FOR TUBERCULOUS LUNG ABSCESS have not, as a rule, been successful. Salomoni[2] reports three cases, however, in which the results are said to have been favorable. One case, Salomoni says, was cured but died, after four years, of tuberculous peritonitis. Another case got well, but died two years later of miliary tuberculosis. We can scarcely consider these results as strongly encouraging. In a third case the abscess had opened by three fistulæ, and bacilli of tubercle were found in the pus. Salomoni resected the ribs from the sixth to the eleventh, and opened the pleural sac with the cautery. The pleural sac contained pus. Salomoni opened with the cautery two cavities in the lung, and packed the cavities with iodoform gauze. Two years later the patient developed a fistula, and was attacked with tuberculous osteomyelitis of the tibia.

---

[1] Deutsche Zeitschrift für Chirurgie, January, 1899.

[2] Revue de Chirurgie, February 10, 1899.

Salomoni says that there are upon record thirty-eight pneumotomies for tuberculosis, with twenty-six cures and eight deaths. If these reports of cases are all authentic, Salomoni is justified in concluding that pneumotomy is of value in the treatment of unilateral tubercular cavities. In spite of these facts I would not operate on such cases. The operation is utterly unjustifiable if the cavity is not circumscribed ; if there are multiple and separate cavities ; if the disease is rapidly progressing, far advanced, or stationary ; or if the patient is in a greatly weakened condition. Such operations are very fatal, and even when the patient recovers from them the disease is not cured. The reported cures are in reality recoveries from operation with benefit more or less prolonged. In Salomoni's three cases the disease was not cured in one of them. One of them died of tuberculous peritonitis and one of general tuberculosis. The third case was living when the report was made, but had developed tuberculous disease of the tibia. If the twenty recorded cures are of this order the performance of the operation is not justifiable.

The EXCISION OF A PULMONARY AREA INFILTRATED WITH TUBERCLE still finds some few adherents. John S. Pyle[1] advocates pneumectomy and believes the operation will cure if used when there is but a single focus of disease. His conclusions are founded on experiments upon dogs. He thinks the proper method is to open the pleura, seize the lung, and drag it into the opening to prevent any considerable pneumothorax. A ligature should be passed around the base of the tubercular mass, which is then removed by the cautery. The stump should be dropped back into the pleural cavity, and the edges of the pleura sutured together. These experiments were made upon the lungs of healthy dogs. Such an operation would be a very different matter performed upon a human being with tuberculous lungs. It is difficult to affirm in any case that there is only a solitary area of pulmonary disease. Again, though the surgeon removes the area of visible disease, it is almost certain that in tissue so susceptible of infection as the lung the disease exists in portions not removed. It is only a stationary limited lesion which can be thoroughly removed, and I believe the prospect of cure if the lesion is stationary and limited is better without operation than with it.

---

[1] New York Medical Journal, June 10, 1899.

Attempts have been made by Farlanini and Murphy to cure pulmonary tuberculosis by establishing ARTIFICIAL PNEUMOTHORAX. There seems to be no doubt that in some cases the development of pneumothorax retards its progress. Murphy and Lemke use nitrogen gas for the purpose of producing the pneumothorax, and believe that the method is of great value.

There are numerous facts to be determined about this method. For instance, can tubercle develop in collapsed lung? If both lungs are diseased, does the collapse of one lung lead to the rapid advance of the disease in the other lung? If only one lung is involved, will its collapse be followed by tuberculosis of the other lung? Does pneumothorax only arrest or can it cure the disease? These problems and others A. F. Lemke has discussed in the *Journal of the American Medical Association*, October 14, 21, and 28, 1899.

Attempts have been made by some surgeons to induce SEROUS PLEURITIS IN PULMONARY TUBERCULOSIS, but, unfortunately, empyema is apt to arise. It has been observed that the occurrence of serous pleuritis sometimes benefits phthisis.

In 1891, Oscar H. Allis, in an address before the Pennsylvania State Medical Society, suggested RIB RESECTION AS A POSSIBLE MEANS OF CURE IN PULMONARY TUBERCULOSIS. If the disease is unilateral, is extensive, and there is a tendency to retraction of the chest-wall, such an operation may do good by permitting retraction. An instance of this operation has been reported by Turban.[1] The patient was twenty-one years of age. The left lung was almost completely destroyed, and the left side of the chest was flat and moved very little during respiration. Contraction of the lung was displacing the heart. Portions of the fourth, fifth, sixth, and seventh ribs were removed without opening the pleural cavity. For a brief period the symptoms were aggravated, but after a little time they were improved and the chest sunk in considerably. Later the symptoms again became worse, and more bone was removed from the sixth and seventh ribs, portions of the eighth and ninth ribs were resected, and the periosteum was removed to prevent formation of new bone. The symptoms improved markedly as the chest contracted further, although tubercle bacilli remained in the sputum. This case was not cured, but Turban believes that a progressive case of pulmonary tuberculosis was converted into a stationary case by the operation.

---

[1] Berliner klinische Wochenschrift, May 22, 1899.

Norman Porritt[1] is an advocate of rib resection in certain cases of phthisis of the apex. He says it is our duty to help nature. Nature endeavors to cure phthisis by the formation of fibrous tissue about the tuberculous area. The young fibrous tissue contracts, the lung contracts as far as it can, but the ribs prevent further contraction. Porritt believes that in phthisis of the apex portions of the ribs should be removed both front and back. He has operated three times. Whereas three cases, as a rule, prove little, we are struck with the fact that one case died of the operation and one died of pneumonia a few days after the operation. One case was greatly improved by the operation, and lived for three years.

Mammary Gland. PRIMARY TUBERCULOSIS OF THE MAMMARY GLAND is a very rare disease, though probably not so unusual as the reported cases would lead us to infer. Some cases regarded as chronic mastitis are undoubtedly tuberculous. "There have been reported fifty-eight authentic cases, while twenty-three others are reported as mammary tuberculosis, but lack positive and conclusive proof."[2] The disease is far more common in women than in men. Cuneo[3] says it is apt to appear in middle-aged women, pregnancy and lactation favoring its development. Reports indicate that it is most common between the ages of twenty and thirty-five (Warden). Warden says statistics show that 89.6 per cent. of reported cases were in females and 10.4 per cent. in males, a disproportion which he regards as accidental rather than essential.

In the male the condition is almost invariably a secondary lesion or else follows traumatism. There are three possible routes of infection: by the lymphatics, by the bloodvessels, and by the milk-ducts.[4] Infection by way of fissures in the nipple is probably far more common than by way of the milk-ducts. The disease is most apt to arise in those predisposed to tuberculosis by heredity. The secondary form of the disease may arise because of extension through the lymph-channels from adjacent tuberculous foci—for instance, from a necrotic rib or a patch of tuberculous pleurisy. The disease may be due to metastasis from a distant focus. The lesion is at first interstitial, and the giant-cells are not situated in the acini (Cuneo). In many primary cases the axillary glands are enlarged. In some cases the axillary glands enlarge before the breast disease has become obvious (Cuneo).

---

[1] Lancet, November 19, 1898.

[2] C. C. Warden, in Medical Record, October 1, 1898.

[3] Gazette Hebdomadaire de Médecine et de Chirurgie, March 19, 1899.

[4] Cuneo, in Gazette Hedomadaire de Médecine et de Chirurgie, March 19, 1899.

In three-quarters of the secondary cases the axillary glands are enlarged (Warden). In some few cases the cervical glands are involved. In many cases enlarged and indurated lymph-ducts run from the tuberculous area in the breast to the glandular mass in the axilla.

In this disease there may be a single focus, but there are usually multiple foci which tend to caseate and coalesce. Cold abscesses may form, eventually the skin becomes discolored and thin, rupture occurs, and the tuberculous focus is exposed, the skin edges being purple and undermined. Roux maintains that three forms of this disease are met with: disseminated tubercles, confluent tubercles, and cold abscess.

As a rule, pain is a marked and early symptom, but in some rare cases it is absent. "The pain is described as being sharp and lancinating, and radiating to the arm, but more or less spasmodic."[1] There is usually tenderness. In a case in the Jefferson Medical College Hospital the pain was very acute and the tenderness was extreme. Such degrees of pain and tenderness are very rare in cancer. In some cases axillary enlargement can be detected. The breast may be larger or smaller than normal. The tuberculous areas grow very slowly, are at first hard, movable, and nodular, but later become soft and immovable. There may be one area or several. If cold abscess arises there will be fluctuation. The skin over the mass is at first movable and natural in appearance, but later becomes adherent and discolored. When rupture occurs a crater-like opening forms in an area of purple skin, and the skin edges are thin and undermined. Multiple openings may form (fistulæ). Tubercle bacilli can usually, but not always, be found in the discharge. The fistulæ do not tend to heal. After secondary infection of an exposed tuberculous area the discharge contains pus cocci, and tubercle bacilli are often hard to discover. In a localized primary tuberculosis, without involvement of the axillary glands or of any other region, the prognosis is good. In a disseminated case, in a case with axillary involvement, and in a secondary case the prognosis is bad.

TREATMENT. In a positively localized case a portion of the breast may be extirpated, or if a cold abscess has formed it may be evacuated, curetted, injected with iodoform emulsion and packed with iodoform gauze. In a disseminated case the surgeon should remove the gland and the axillary lymphatics as he would in cancer, although it is not necessary to remove any portion of the pectoral muscle, because the muscle does not become infiltrated. If advanced tuberculosis exists in any other part of the body it is not proper to perform the radical operation. After any operation endeavor to combat the tuberculous tendency by the usual means—dietetic, hygienic, and medicinal. Cuneo says if a patient refuses to submit to the knife a cold abscess may be treated by aspiration and injection of an ethereal solution of iodoform. Warden considers that the proper treatment is the complete removal of the breast, and also of the axillary lymphatics "when it can be demonstrated that they are involved,"[1] although, he thinks, in some cases of primary tuberculosis, if the axillary glands are free, it may be sufficient to incise, curette the abscess walls, and drain. If the radical operation is permitted he advises it in preference to the more conservative method. "In the secondary variety of the disease the surgeon must decide how much operative interference the patient will be able to endure. The primary seat of trouble may be in the lung, and in such cases the removal or mere incision of the breast, even for the relief of pain, must depend on the strength of the patient and the length of time the original focus has been active. In weak or young patients palliative measures may be tried, and the breast treated by applications containing resorcin or ichthyol, with perhaps belladonna or opium for the relief of the pain."[2] In tuberculosis of the breast there is a strong tendency to infection of the lungs.

---

[1] C. C. Warden, in Medical Record, October 12, 1898.

Cysts of the Breast. Cysts of the breast often develop in a tumor as a part of the tumor. Single cysts unconnected with tumors are rare. In an analysis of over 2300 tumors of the mammary gland, W. Roger Williams shows that 2.6 per cent. were cysts. It is very important to determine whether a cyst is part of a tumor or whether it itself constitutes the disease. Cysts may be formed in the secretory structure of the gland, and such cysts are lined with epithelium; they may be new formations, in which case the wall is fibrous tissue (S. W. Gross). Gross insists that the ordinary classification of cysts is purely artificial, as it is founded on the nature of their contents. If cysts are classified according to their derivation they are divided into retention-cysts and cysts of new growth. Retention-cysts are common, and are due to obstruction or obliteration of the lactiferous ducts, the secretions accumulating back of the obstruction, distending the parts, and forming a simple cyst. Such a cyst usually contains thin, turbid, yellowish or brownish serum. In a series of cysts reported by William T. Bull, out of forty-seven cases thirty-nine were of this variety.[3] Such cysts may be single or multiple, and may involve one breast or both. In S. W. Gross' twenty-two cases of simple evolution cysts, seventeen were single. In Bull's thirty-three cases the cyst was single in one breast in twenty-six cases, and in seven cases there were twenty more cysts. These cysts vary in size from microscopic cysts to the dimensions of an orange, or even larger. In some cases a blow is assigned as the cause (in six out of Bull's thirty-nine cases); in others the condition has been preceded by chronic mastitis or ulceration of the nipple (in four of Bull's cases). There is sometimes, but not commonly, a discharge from the nipple, or fluid may be squeezed out. Thus it is that the dimensions of a cyst may vary. A cyst may, when completely emptied, disappear for a time. Sudden diminution in the size of a tumor points to cystic disease. If there is a discharge it may be yellow, or brownish and turbid, or it may be bloody. Bloody discharge points to intracystic papillomatous growths, growths which may be of ominous augury as possible precursors of duct cancer. At what age is the condition met with? Seventeen of Bull's thirty-nine cases were between forty and fifty; ten were from thirty to forty; nine were over fifty, and three were under thirty.[1] Occasionally, though very rarely, an enlarged axillary gland can be detected. Bull noticed this condition in two cases, and notes that in each case the gland was soft. These cysts are smooth, rounded with distinct outlines, firm and elastic. Fluctuation is rare. The skin is not adherent to the cyst, is often tightly stretched, and the cutaneous veins may be enlarged (Bull). Pain is not unusual. In one-fourth of Bull's cases there was some pain near the axilla, often radiating into the arm. This point may aid in the diagnosis, for a recent and small focus of cancer rarely causes pain. The exploring needle may be required to settle the diagnosis. Such cysts may disappear spontaneously.

---

[1] Medical Record, October 1, 1898.

[2] C. C. Warden, in Medical Record, October 12, 1898.

[3] Medical Record, April 2, 1899.

TREATMENT. Of sixteen cases Bull aspirated, fourteen were cured, and in two the cyst again filled. Bull believes that in the case of a medium-sized cyst, after the diagnosis has been confirmed by puncture, the cyst should be emptied by aspiration.[2] He does not believe in external applications or injection of the cyst. If the cyst recurs, if it is very large, if the patient is very anxious and apprehensive, or if there is more than one cyst, Bull advises excision. I believe if the discharge from the nipple is bloody that the breast should be removed, the intracystic growths should be at once examined, and if there is any suspicion of cancer the axillary glands should be removed. Bull had eight cases of general cystic disease. General cystic disease arises from obstruction of minute ducts, is common in chronic mastitis, and is often due to papillary growths (Sheild). Multiple cystic disease may be associated with fibro-adenoma. The condition arises after the age of thirty-five. One or both breasts may be attacked, and the cysts vary in size from a pea to a cherry (Gross). In this disease the indurated areas may suggest the existence of carcinoma. In three of Bull's cases there was lumpiness of the breast. Some surgeons think that the condition is apt to evolve into cancer. Bull says there is little evidence to this effect.

---

[1] Medical Record, April 2, 1899.

[2] Ibid.

Those who believe cancer is apt to follow recommend removal of the breast. Bull says the development of the cyst is slow, and it is justifiable to defer excision until cyst formation is very marked and the size of the breast is markedly increased.[1] To repeat, if there is a bloody discharge from the nipple I believe the breast should be promptly removed.

Carcinoma of the Breast. DIAGNOSIS. Cancer of the breast is often unmistakable, but in other cases the diagnosis may be difficult. In fact, in some cases a conclusion is only reached after an exploratory incision. To incise the growth as it lies in the breast is not wise. If it is not cancerous no harm will result, but if it be cancerous the fluid liberated from the growth may carry embryonal cells into sound tissue, and these cells may take root and grow just as do skin-grafts. In sarcoma such growths can certainly follow an operation which liberates sarcoma fluid into sound tissue. It is probable that in cancer the same process may take place. Growths so induced are not to be regarded as resulting from malignant infection, but rather as instances of the transplantation and grafting of malignant cells. In order to avoid such a catastrophe in making a diagnostic exploration, the growth should not be incised, but should be excised, and should be cut and studied after it has been removed. W. Watson Cheyne[2] fathers the above view. He says in doubtful cases the swelling should be excised with an area of apparently healthy tissue, and should not be incised until it is out of the body and away from the seat of operation. He says that it is probable in carrying out the excision lymphatic vessels containing cancer cells will be cut across, but in the vessels the cells are not numerous and are more adherent than the cells in the growths, and hence but few are disseminated.

After removing a growth and sectioning it, the knife used should be put aside and a clean one substituted for the performance of the operation proper. In doubtful cases Keen has a pathologist present who makes sections as soon as the growth is removed, examines them with a microscope, and furnishes a report in a few minutes.

TREATMENT. Can carcinoma of the breast be cured? In the opinion of many notable men it can be if the operation is performed thoroughly and early. The modern complete operation has been evolved from the labors of Moore, the younger Gross, Banks, Meyer, Halsted and others. It consists in removing the entire gland and its outlying lobules, much of the adjacent tissue—fatty, areolar, fascial, and muscular—the axillary fat and lymph-glands, and the lymph-tract from the breast to the axilla, the lymphatics of the space of Mohrenheim, and it may be, also, the supraclavicular glands.

---

[1] Medical Record, April 2, 1899.

[2] Lancet, March 18, 1899.

As Matas says, surgery seeks to "thoroughly eradicate the primary focus of infection in the breast, together with most frequent extrathoracic routes of lymphatic contamination."[1]

The surgeon must remove the disease without regard to the extent of the wound, and must not be deterred by the fear that he cannot close the wound. The entire gland must be removed, because we know that in cancer the skin and portions of the gland far beyond the region obviously involved are affected. In fact, in cancer of a portion of the breast practically the entire breast is diseased. This statement has been verified by microscopical studies. Stiles, Sappey, and Heidenhain have shown that in carcinoma of the breast, however small, the entire breast must be regarded as diseased. W. Watson Cheyne[2] says that cancer cells may be deposited in any part of the breast and the deposit for some time cannot be detected clinically, and he points out that these cells may pass to the suspensory ligaments, to the cutaneous lymphatic plexus over the breast, to the pectoral fascia, to the fat and fascia and lymph-vessels between the breast and axilla, and to the glands and lymph-vessels of the axilla. Cheyne reminds us that the breast is a much larger gland than was formerly supposed, and that outlying portions reach forward to the middle of the sternum and backward to the edge of the latissimus dorsi muscle, upward to the clavicle, and downward to the abdominal muscles.[3] Some surgeons remove the pectoral fascia, but do not remove the pectoral muscle unless it is obviously diseased ; others remove the sternal portion of the greater pectoral ; still others remove both pectorals. J. Rotter[4] insists on the necessity of completely removing the sternal portion of the great pectoral muscle. He has found by dissection lymphatic glands in the following situations : Along the main trunk of the superior thoracic artery and along the branches of this vessel ; in one-half of the cases along the external mammary artery ; occasionally along the perforating artery. In cancer of the breast, as any or all of these glands may become infected, they must be removed, hence the sternal portion of the great pectoral muscle must be removed. James B. Bullitt[5] thus describes the lymphatics of the mammary region :

"The superficial lymphatics of the outer two quadrants of the breast pass beneath the skin to join lymphatic glands lying beneath the lower border of the pectoral muscle. This group connects with and joins together several other groups of lymph-nodes, the location of which is of importance. The axillary group consists of ten or twelve glands, large in size, some of which are dispersed in the loose areolar tissue, while others form a chain around the axillary vessels. A small chain runs along the lower border of the pectoralis major muscle, receiving the lymphatics from the front of the chest and mammæ, this group having been already referred to. Another group is placed along the lower margin of the posterior wall of the axilla, receiving the lymphatics from the integument of the back. Immediately beneath the clavicle and under the pectoralis minor muscle, in the so-called space of Mohrenheim, are two or three subclavian lymph-nodes. Through these the axillary, supraclavicular, and deep cervical glands communicate with each other. In this way the supraclavicular and deep cervical glands, along the sheaths of the subclavian and carotid artery and internal jugular vein, are sometimes infected. The deep lymphatics of these two quadrants have their origin in the milk-ducts and acini. They form a rich plexus, and pass downward to the fascia covering the pectoral muscle; coursing along this, they finally join, at the lower border of the pectoral muscle, the lymphatics of the axilla. The superficial lymphatics from the two inner, or sternal quadrants of the breast, are joined by the deep lymphatic vessels and penetrate the intercostal spaces from the second to the fourth, to finally join the lymphatics of the anterior mediastinum. These lymphatics soon come to lie so deeply as to elude the surgeon. The two inner quadrants are seldom involved; the cancerous process, in the great majority of cases, having its inception in the two outer quadrants, most frequently the outer and upper.

---

[1] Philadelphia Medical Journal, September 17, 1898.

[2] Practitioner, April, 1899.

[3] Ibid.

[4] Archiv für klinische Chirurgie, Band lviii., Heft 2.

[5] Medicine, February, 1899.

"According to Volkmann, it sometimes happens that the glands in the opposite axilla are infected; still more rarely, that these alone are involved. This can occur when the cancerous growth is on the sternal side of the breast, and is accounted for by a communication between the lymphatics of the two sides across the median line."

Halsted was one of the earliest and is one of the most positive and convincing of the surgeons who believe in radical operation. His operation is extensive and very thorough, and requires from two to three hours to perform. In its performance he limits hemorrhage to the smallest possible amount, tying many vessels before he cuts them, and ligating even the most minute bleeding points. He uses fine silk as a ligature material. Halsted says[1] that of late he has made his operation more radical. Besides removing all the skin over the breast, an extensive area of subcutaneous tissue, the pectoral muscles, the lymph-tract from the breast to the axilla, and the glandular, areolar, and fatty contents of the axilla, he now almost invariably clears out the supraclavicular region. He justifies going above the clavicle by the fact that careful studies made in the Johns Hopkins Hospital show that in 34 per cent. of cases of carcinoma of the breast the supraclavicular glands are involved. He makes a vertical incision at the posterior border of the sternocleidomastoid muscle, and begins the dissection at the junction of the internal jugular and subclavian veins. It is not necessary to divide the clavicle. Halsted thinks it likely that he will finally come to remove the glands from the anterior mediastinum. As a matter of fact, Dr. Bloodgood has invaded the mediastinum in some cases, and in one case removed a portion of the innominate vein. Halsted thinks well of Bloodgood's suggestion, that the fat and glands should be removed from beneath the latissimus dorsi muscle. Halsted's operation as performed by himself or his assistant impresses an onlooker by its thoroughness and by the precision with which glandular regions are sought for, found, and cleared. The large wound cannot be closed by suturing. Its size is lessened by purse-string sutures of silver wire, and large skin-grafts are at once applied. In spite of the length of the operation there is not much shock because the hemorrhage is kept down to a trivial amount and the ether is very carefully given. Halsted's results have been admirable. He has published a report upon seventy-six patients operated on over three years ago.[1] Of these, thirty-one are now living, free from any evidence of metastasis or local recurrence. Of ten patients who died more than three years after operation only one showed local recurrence. Thus more than 52 per cent. of his patients passed the three-year limit without any evidence of local recurrence or metastasis.

---

[1] Annals of Surgery, November, 1898.

Some surgeons differ from Halsted as to the desirability of prolonging the operation so greatly. Halsted prolongs it in order to make it thorough, and his results speak eloquently for his method. Watson Cheyne does not prolong it to such a degree and does not remove as much tissue as Halsted, and his results are nearly as good. Out of sixty-one of Cheyne's cases, thirty were still free from evident metastasis or recurrence at the end of three years—that is, nearly 50 per cent. of his cases can be considered as cured. If the operation is performed as Halsted advocates, the careful hæmostasis is essential to prevent dangerous shock. If it is performed on the order of Cheyne's method, the operation is of shorter duration, such careful hæmostasis is not absolutely essential, and considerable blood is often lost.

When there is considerable hemorrhage the shock is often pronounced. In several of my cases it has been alarming, but only once have I seen death occur from it. The average death-rate in this operation is about 2 per cent. I have operated seventy-eight times with two deaths. One death was due to shock. In one of the cases it was found during operation that the cancer involved the mediastinum and pleura. The pleura was accidentally opened before the operation was abandoned. The opening could not be sutured but was closed by means of gauze packing and pneumothorax did not result. The patient was greatly shocked, and death took place in a few hours. This was not a proper case for operation, and would not have been operated upon had the extent of the disease been recognized. The other death occurred a number of days after operation. The patient was an ill-nourished elderly woman, whose urine contained a little sugar. An ill-advised attempt was made to bring the skin edges together. This was accomplished with considerable tension, sloughing ensued, and the flaps became gangrenous. It would have been the part of wisdom to have refused operation in this case. In my earlier cases I was too anxious to close the wound by sutures. In my later cases I have disregarded this point, and have performed Halsted's operation with the exception that the neck has not been invaded as a rule. I believe that the method of Halsted, with careful arrest of hemorrhage, is a safe operation, and is the most thorough one which can be done. In regard to opening the posterior triangle of the neck, I have been in much doubt and have been inclined to the view of Cheyne, that such a procedure is either unnecessary or useless—unnecessary if the glands are not involved ; useless if they are, because if the glands of the neck are involved it seems almost certain that the mediastinal glands must be. Halsted's above-quoted paper has shaken this conviction, and his improved statistics are significant of benefit in this addition to his operation.

---

[1] Annals of Surgery, November, 1898.

In the majority of the cases, except the more recent ones, I removed most but not all of the skin over the breast, carried the incision some distance above and below the breast, and opened the axilla from in front. The advantages obtained by opening the axilla in front are great, and have been recently well set forth by the younger Senn.[1] The prolongation of the incision renders subsequent approximation much easier than when the incision is shorter. My cases cannot be utilized for statistics, as many of the patients have not been traced, but from the tracing of a number who live in this city I am convinced that my results have been far less favorable than those of Halsted and Cheyne. For these reasons I expect in the future to abandon the less radical method and employ the thorough operation of Halsted. In doing this I will bear in mind the statement of Rudolph Matas,[2] who says : " I have now performed the more radical operation, as formulated by Halsted and Meyer, often enough to convince me that in very advanced cases (*i. e.*, those in which the upper axillary, subscapular, and posterior cervical lymphatics are markedly involved) it offers no more prospect of cure or chance of escape from internal metastasis and secondary recurrence in the neck than the older and less mutilating operations."

---

[1] Journal of American Medical Association, May 27, 1899.

[2] Philadelphia Medical Journal, September 17, 1899.

Henry T. Butlin[1] is a firm believer in the curative power of Halsted's operation. He has performed it thirty-three times. Only thirteen cases are available for report, of which nine have been well for over three years. A report which embraces but thirteen cases out of thirty-three is, of course, by no means conclusive.

W. Watson Cheyne,[2] in an article upon cancer, says that the three-year limit of Volkmann is not universally correct; but, as a matter of fact, if a patient is well at the end of three years the chances are she will remain well. König says the odds in favor of a patient who has passed the three-year limit are 6 to 1. Cheyne considers König's estimate of recurrences as far too high, and would estimate it at 17 to 1. In his own thirty cases which have passed the three-year limit but one has developed cancer. A point on which information is urgently needed is that of the chances of life in patients who have passed the three-year limit, and also what they die of. It is certain that patients in this group have little risk of local and regional recurrence, but it is not certain that the risk of metastatic growths is equally great. It is probable that death which occurs in some of these patients is caused by cancer in some internal part.

In this connection J. E. Simpson's report on Barker's cases is of importance.[3] There were ninety cases operated upon; seventy were alive one year after the operation; forty-nine two years after; thirty-three three years after; nineteen four years after; fourteen five years after; eight six years after; four seven years after; three eight years after; three nine years after; three ten years after, and one eleven years after.

W. Watson Cheyne[4] is one of the most successful of modern operators. He insists, as does Halsted, on the free removal of the skin, independent of the question of subsequent closure, and believes that all of the skin over the breast should be removed, no matter how small the tumor may be. If the tumor lies on the side of the breast, he makes a special incision around it. Cheyne's incisions for tumors in different situations are shown in Figs. 7, 8, 9, 10, 11.

These drawings represent the virgin breast, and in a large and pendulous breast the incisions must be much further apart. Another important detail pointed out by Cheyne is that the incisions shown in the pictures are not carried at once to the muscles, but the skin and only

---

[1] British Medical Journal, December 3, 1898.

[2] Practitioner, April, 1899.

[3] Lancet, July 8, 1899.

[4] Ibid., March 18, 1899.

FIG. 7.

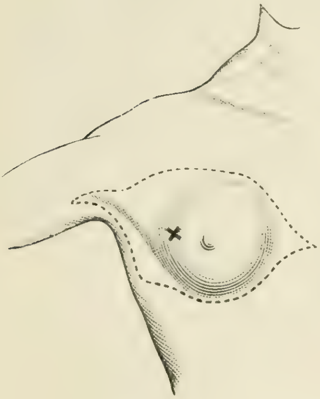


FIG. 8.

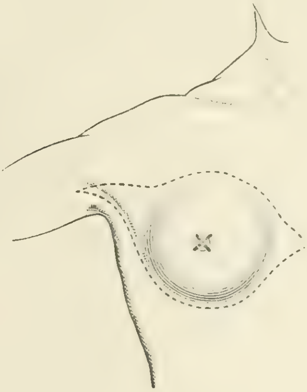


FIG. 9.

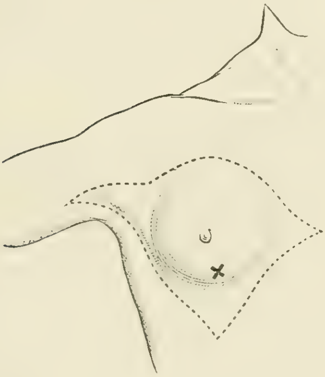


FIG. 10.

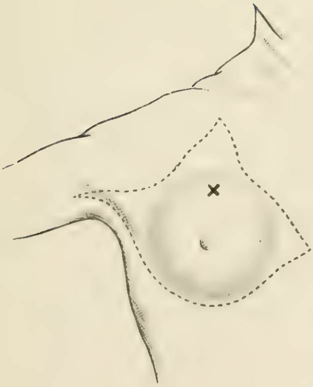
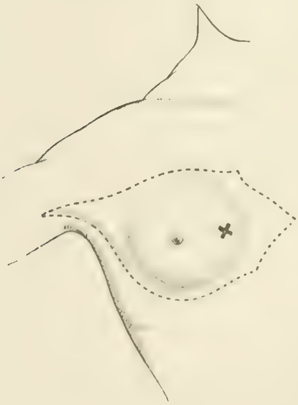


FIG. 11.



enough fat to secure its vitality are dissected up nearly to the clavicle, across the mid-line in front, over the edge of the latissimus dorsi muscle posteriorly, and below to over the origin of the abdominal muscles. In the further progress of the operation he removes the fat and invariably removes the pectoral fascia, taking with the fascia the great pectoral muscle or at least a superficial layer of the muscle. He maintains that it is best to remove the lower half of the great pectoral in every case, removing the entire muscle only in those cases in which there is obvious disease of the muscle itself. Cheyne removes also the fascia from the lesser pectoral muscle, but does not remove the muscle. He most carefully removes glands, and calls attention to the fact that the usual course for the lymphatic infection to take is to the glands along the axillary vein, usually to the pectoral side of the vein and up to the apex of the axilla, and from here to the root of the neck and also, probably, to the mediastinum. Cheyne points out that occasionally, though rarely, the course of the infection is to glands back of the axillary vein, and from these to the posterior triangle of the neck. Cheyne's former view was, I believe, that it is useless to open the posterior triangle. His present view is somewhat different. He does not open the posterior triangle if he detects no enlargement there unless, after opening the axilla, he finds enlarged glands back of the axillary vessels and passing up toward the neck. In such a case he assumes that the course of infection is toward the posterior triangle, and clears it out. When he does not find evidence that the course of the infection is toward the posterior triangle he does not care to prolong the operation and increase the shock by clearing it out.[1] From the above remarks it would seem that Cheyne does not attach great importance to opening and clearing the triangle of the neck. In fact, he states that he has never seen, after an operation which did not invade the neck, a recurrence in the glands of the neck, and he is inclined to doubt whether it is worth while to operate upon a patient who has marked enlargement of the cervical glands. He does not regard such enlargement as a positive contraindication if the patient's general condition is such as to justify a prolonged operation, but he cannot believe that after such an operation there will be no recurrence. Cheyne finds that by free undermining of the skin the edges of the wound can usually be approximated, but if this is found to be impossible, he applies grafts at once, or, if the patient is weak and exhausted, after ten days.[2]

To show how very radical an operation may sometimes be performed with advantage, note the case operated upon by Halsted, in which he performed the radical operation, and also removed portions of the fifth, sixth, and seventh ribs.[1]

---

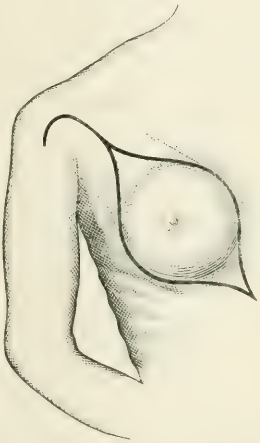
[1] Lancet, March 18, 1899.

[2] Practitioner, April, 1899, and Lancet, March 18, 1899.

Assaky[2] has warmly advocated Halsted's operation; in fact, he removes more skin than does the Baltimore surgeon. He thinks it desirable to close the large wound thus formed, and does so by carrying a horizontal incision from the wound above the other breast to the anteriorly axillary line of the sound side, and another horizontal incision parallel to the first from the wound along the lower margin of the other breast to the anterior axillary line. A short vertical incision is carried from each horizontal incision toward the sound breast. By sliding, the quadrilateral flap can be made to cover the defect. It does not seem desirable to so greatly extend the limits of the operation in order to obtain closure of the wound. Closure is not of sufficient importance to justify it. Besides, closure can often be obtained much more easily by Cheyne's method, which is described above. Even if approximation of the edges of the wound is not possible, skin-grafting is a safe and fairly satisfactory procedure.

Some pages back note was made of the advantages obtained by entering the axilla from in front rather than from below. The younger Senn wrote an instructive article upon the subject.[3] The incision he employs is shown in Fig. 12. Senn maintains that this incision exposes a larger field for radical operation than does the ordinary incision. When traction is made on the axillary flap it can be easily freed from the subcutaneous tissue; the position of the axillary vein is readily discovered; all landmarks are well in view, and the danger of injuring the vein is reduced to a minimum; the dissection is carried out away from the vein and not toward it, as in the old operation; the anterior incision is in a region which can be thoroughly cleansed; the hairy axilla is hard to cleanse; the resulting scar does not tie the arm to the side, and is not subsequently pulled upon and stretched. As a matter of fact, the anterior incision is a part of the Halsted operation, although Halsted exposes the vein higher up toward the clavicle than does Senn.

FIG. 12.



The younger Senn's incision for amputation of the breast.

Treatment of Inoperable Cases. A radical operation should not be attempted if the disease is so extensive externally that complete removal is impossible, if there are internal deposits of cancer or deposits anywhere which are irremovable. It used to be held, if the ribs were involved, that radical removal was impossible. This is true, as a general thing, but sometimes, as Halsted's case proves, the operation is possible. In a recent case of my own a recurrent nodule was adherent to a rib and the rib was infiltrated. The growth and a portion of the rib were removed nine months ago, and up to the present time there has been no evidence of recurrence. Extensive glandular involvement in the posterior triangle of the neck contraindicates operation. The sternum should be examined to see if it bulges forward. Snow claims this is apt to occur from infiltration secondary to involvement of the thymus gland. If Snow's sign is present radical removal is out of the question. If the head of the humerus is enlarged from metastatic deposit, which Snow says may occur, radical operation offers no hope. If both breasts are affected the general rule is not to operate, although recently Mr. Gould[1] removed both breasts at one operation and the woman recovered. If the axillary nerves are involved in a cancerous growth, operation gives no prospect of cure. Cancer *en cuirasse* cannot be completely removed.

---

[1] Quoted by Nathan Jacobson in Medical Record, February 25, 1899.

[2] Münchener medicinische Wochenschrift, February 28, 1899.

[3] Journal of American Medical Association, May 27, 1899.

It may be necessary to refuse operation because a patient is extremely weak and exhausted. Some surgeons will not operate on an atrophic scirrhus The younger Gross would not operate on atrophying scirrhus. If a patient is very old or very feeble, conservatism seems eminently proper. Such a growth is in a state which Bennett speaks of as " negative malignancy," and a patient may live for years in spite of it. If, however, the patient is neither very old nor very feeble, radical operation should be performed because, as Cheyne well says, atrophic scirrhus of all forms of cancer gives the best prospect of cure. If a radical operation is out of the question a palliative operation may possibly relieve the patient for a time and permit of a more merciful death by internal growth. A palliative operation may be performed to remove a foul, stinking mass, the breast being cut away and the wound closed. Such wounds are apt to heal rapidly. If pain is severe and harassing, it may be advisable to divide the axillary nerves.

In inoperable cases of carcinoma the injection of alcohol about the growth finds some advocates. Erysipelas toxins occasionally benefit or even cure spindle-cell sarcomata, but seem useless in cancer. Serum-therapy is of no avail. Herbert Snow[2] says that the true function of lymphatic glands in cancer cases is not only to arrest cancer-cells, but to destroy them to a certain extent, the efforts of the gland finally proving nugatory because of the great number of the cancer-cells. Snow has recently administered to several cases of carcinoma an extract of fresh lymph-glands, and he believes it produced some benefit.

---

[1] J. B. Darby, in Middlesex Hospital Journal, February, 1899.

[2] Lancet, October 15, 1898.

If a cancer is inoperable opium or morphine should be ordered. We should not defer giving opium until the patient is wellnigh exhausted by pain and want of sleep. If it is given comparatively early it seems to have a retarding effect on the growth and to postpone ulceration. Snow goes so far as to maintain that it may convert the growth into an atrophying condition. I have never seen such a fortunate outcome. There is no fixed dose. Enough must be given to allay pain and secure sleep, hence the dose must be progressively increased. It should be given by the mouth except when there is an excessively violent paroxysm of pain, at which times morphine may be given hypodermatically. Persistent hypodermatic use of morphine is not advisable, because these patients become cachectic, weak, anæmic, and emaciated, and the injections may be followed by abscesses. For administration by the mouth we may give morphine or opium, alone or combined with cocaine (Snow). The most satisfactory preparation is acetum opii, as it does not constipate so markedly as do the other forms of opium.

Some surgeons approve of electrolysis or cataphoresis in the treatment of cancer. It is never to be used in operable cases of cancer of the breast. To do so is absolutely and always unjustifiable. It is very doubtful if electricity is capable of completely removing the primary growth. It is certain that it is not capable of removing the secondary glandular growths, and any proceeding which fails to remove associated glandular growths is incomplete, trifling, and useless. To state that electricity is a cure for cancer is to lead patients to defer operation, it may be, until hope of cure is gone. G. Betton Massey, in a paper read at the last meeting of the American Medical Association, took a diametrically opposite view. He advocates treatment by the cataphoric method. In this method he diffuses nascent mercuric salts through the growth by means of an electric current. He claims that this proceeding destroys the "germs" of a primary growth and also destroys the prolongations of the growth and the colonies about the growth, and permits us to *leave unaffected portions of the organ* (italics are mine). He maintains that after this procedure there is less likelihood of recurrence than after the use of the knife. In a tumor of the breast, how would he accomplish complete removal? He cannot destroy the axillary glands, and yet, as a rule, these glands are involved ten or eleven weeks after the start of the primary tumor. He would leave unaffected portions of the organ, and yet we know that in cancer practically the entire breast is diseased. If recurrence of the growth is less common after such improper, injudicious, and injurious meddling, it can only be because continuance of the tumor is the invariable rule.

The entire growth is not removed, and the remainder must continue to grow. Massey further says that the cataphoric method may be used in inoperable cases and may cure them, but that it is most useful in the early stages of primary growths and in the early stages of local recurrences. The only conclusion which seems possible after reading Massey's laudation of an obviously incomplete removal is that he has dealt chiefly with innocent growths rather than with malignant tumors, and that erroneous diagnosis is responsible for erroneous conclusions and pernicious teaching.

THE ELECTROLYTIC TREATMENT OF INOPERABLE TUMORS has been advocated by Max Melchior, of Copenhagen.[1] He is cautious in his claims, careful in his deductions, and admits that up to the case of sarcoma recorded in his paper "no case is in evidence of an inoperable, indubitably malignant tumor having been definitely cured by electrolysis." Melchior reports a case of sarcoma of the neck apparently cured. This method, he thinks, may be of service in inoperable tumors. If it is used, he advises us to employ the method of Kaarsberg, of Denmark, who first removes as much as possible of the tumor with the knife, and "not till then applies electrolysis to the exposed remains of the growth." Melchior maintains that only necrosis of diseased tissue is brought about, as sound tissue is more proof against the effect of the current. In the debate on Melchior's paper, Mr. Stanley Boyd observed that unless electrolysis has a selective action on malignant tissue and leaves normal tissue it can hardly possess advantages over the cautery or caustic pastes.

OÖPHORECTOMY FOR INOPERABLE OR RECURRENT CANCER. This operation was suggested by Beatson, of Glasgow, and last year, in PROGRESSIVE MEDICINE, his theory was briefly sketched. Recently, Beatson has suggested the following view of the causation of cancer:[2] The body cells originally possessed reproductive powers. In the course of development the reproductive powers of early embryonic life are not lost, but pass into a condition of abeyance because they are checked or restrained by a powerful influence. This restraining power may reside in or be due to healthy ovaries. Ovarian changes alter secretion or cause migration of ovarian cells. A portion of the body irritated by altered ovarian secretion, or a part of the organism which catches up and holds ovarian cells, may become cancerous. Men, of course, often develop cancer, and it has been thought possible that the testicles exercise an influence over epithelium. Beatson has made a series of experiments, transplanting testicles and portions of testicles, with negative results.

G. E. Herman[3] has reported a case of recurrent cancer of the breast which he believes was cured by oöphorectomy and the administration of thyroid extract. Certain it is that the woman was much improved. In May, 1895, the breast had been removed, and in October, 1895, an area of recurrence was removed. In July, 1898, she presented an extensive ulcerated area over the former site of the right breast, a hard lump in the left breast, and enlargement of the left axillary glands. Menstruation was irregular, and the woman was at the beginning of the menopause. In the same month (July, 1898) Herman removed both ovaries and began the administration of thyroid extract. By March, 1899, the ulcer was healed. There are some keloid-like nodules remaining which do not increase in size. The lump in the left breast and the enlarged axillary glands in the left armpit can no longer be felt. In discussing this paper, Stanley Boyd and Battle expressed the opinion that the keloid-like nodules were malignant. Herman did not think so. Nevertheless, even if not cured, the patient was extraordinarily improved, and we do not expect improvement spontaneously in cancer. The tendency has been to only consider the performance of oöphorectomy in patients who have not reached the menopause. A very important fact about this case is that the patient was forty-nine years of age, and had reached or was on the verge of the menopause, for the menstruation had been irregular for six months and had been absent for three months.[1] Herman believes that thyroid extract contributed to the good result in his case. Boyd doubts it. Boyd has reported seven cases of his own treated by oöphorectomy only, and one of these cases shows less evidence of remaining cancer than does Herman's case.[2] In one of Boyd's cases the cancer disappeared rapidly and almost completely after oöphorectomy only, but the growth soon reappeared. Boyd inquired, was this rapid reappearance due to the fact that thyroid was not administered? He placed the patient upon thyroid; there was no improvement in the cancer, but the woman quickly lost five pounds. Boyd does not think that the evidence in favor of thyroid is strong.[3] In view of the evidence, it seems impossible to doubt that in some few cases the removal of the ovaries has been followed by the disappearance of cancer of the breast. Is the operation justifiable? Stanley Boyd[4] says this can only be determined when enough cases have been reported to show in what proportion it does good, and what is the duration of the relief obtained.

---

[1] British Medical Journal, November 5, 1898.

[2] Ibid., February 15, 1899.

[3] Lancet, April 15, 1899.

Boyd finds fifteen reported cases, seven of which were his own. In his seven cases there was undoubted benefit in two; there was probable benefit in two; there was no benefit in three. In the fifteen collected cases the relief in four cases was worth obtaining, and in two other cases there was some improvement. Cheyne believes that the effect of the operation is toward transitory improvement. Boyd concludes that the failure of the operation to act in some cases may be due to the fact that the internal secretions of the ovaries vary, and only when the variation is of a particular kind does it favor the development of cancer. He thinks the ovary is not the exciting cause of cancer, but it seems to have a predisposing influence. Boyd regards the operation as justifiable.[1]

---

[1] Stanley Boyd, in Lancet, April 29, 1899.

[2] Ibid.

[3] Lancet, April 29, 1899.

[4] British Medical Journal, February 4, 1899.

THE PERICARDIUM, HEART, AND BLOODVESSELS.

As remarked by Herbert L. Burrell:[2] "The surgery of the heart and pericardium is in an undeveloped condition." Burrell concludes that experience justifies us in taking a bolder course than is usually taught in dealing with certain lesions of the heart and pericardium. He says that "the lesions of the heart and pericardium, which may be treated surgically, are the result of both injury and disease, and they comprise wounds and ruptures, effusions or hemorrhage—often resulting in distention of the pericardium and pressure on the heart."

Wounds of the Heart. It is a well-known fact that of a great number of reported cases of wounds of the heart in but few was death instantaneous. This has not been the accepted view, and the general opinion has been that a cardiac wound meant instant death. Jamain's statistics, including 121 cases, prove that instantaneous death is rare. A. Podrez[3] quotes Fischer, Ollier, and Sanson to the same effect. Fischer, in 1868, made a study of 452 cases, and estimated the mortality of non-penetrating wounds of the heart at 90 per cent. Ollier and Sanson reported twenty-nine cases of penetrating wounds of the heart, in which the victims lived more than two days. Fischer believes that the right ventricle is not often wounded. Podrez voices the general opinion of surgeons of experience when he says that wounds of the auricles and coronary artery are far more dangerous than wounds of the ventricles. This is because of the peculiar arrangement and considerable number and bulk of the muscular fibres of the ventricles. Hemorrhage is far more apt to be spontaneously arrested after a ventricular than after an auricular wound.[4] Jamain's statistics show that in thirty-five cases in which the left ventricle was wounded the patients lived from four hours to twenty-five days; that of a number of cases in which the left ventricle was wounded several patients lived one-half hour, and one lived six months. In wounds of both ventricles a number of patients lived from one hour to five months. Two patients wounded in the left auricle lived for one and two days respectively. Seven cases wounded in the right auricle lived from seven hours to twenty days.[1] Wounds of the coronary artery are always fatal, not of necessity from hemorrhage, but rather because the nutritive supply of the heart is cut off (Podrez).

---

[1] British Medical Journal, February 4, 1899.

[2] International Text-book of Surgery, edited by J. Collins Warren and A. Pearce Gould.

[3] Revue de Chirurgie, May 10, 1899.

[4] Ibid.

"In the *Index Catalogue* of the library of the Surgeon-General's Office, U. S. A., there are reported twenty-two cases of direct injury to the heart, all of which lived over three hours; seventeen lived over three days; eight lived over ten days; two lived over twenty-five days; one died on the fifty-fifth day; and there are three well-authenticated recoveries."[2] It has been stated that 12 per cent. of stab wounds of the heart recover; but Wyman asserts that pericardial lesions are probably included in this estimate with cardial lesions.[3] Loison[4] has collected the cases reported since Fischer published his paper in 1868. He finds 227 reported cases, the mortality being 84.8 per cent. This mortality agrees almost exactly with Fischer's estimate.

In Loison's tables needle wounds give the best prognosis, and show a mortality of 61 per cent. In most of the cases which recovered the needle was withdrawn. In some it was not. In one case the fifth rib was resected, the pericardium was incised, and the needle was seen fixed transversely in the right ventricle. It could not be withdrawn, but in spite of this the patient recovered. The mortality is shown by the tables to be much larger in stab wounds. Only eleven out of ninety cases recovered. One of these recovered without operative aid. In three of the recoveries the pericardium was opened and packed with gauze. In two cases suppuration occurred in the pericardium, and recovery followed incision and drainage. In three of the recoveries the pericardium had been sutured, and in one the heart was also sutured. Out of the ninety cases twenty-three were operated upon.

Professor Giovanni Ninni[5] combines the statistics of Jamain, Latelenet, and Fischer, and estimates that only 19 per cent. of cases of penetrating wounds of the heart die immediately. This author alludes to eight cases which were treated by suturing.

It becomes evident, from a study of such facts, that the old idea which conceived a wound of the heart to be necessarily immediately fatal is wrong. Less than one-fifth of the cases are immediately fatal. There is often time for surgical interference, without which there is little chance of recovery. Surgical interference may save life. Operations are becoming much more frequent than formerly. These operations have shown what experiments upon animals previously indicated, that the heart and pericardium are more tolerant of interference than was formerly believed.[1] The cases in which the surgeon does interfere will of course be few, and will far oftener be ventricular than auricular injuries. There is little chance for life after a bullet wound of the heart, although Podrez operated on such a case and recovery followed. As a rule, surgical treatment in wounds of the heart has been too conservative rather than too radical. E. Loison,[2] from his tabulation of fifty-four cases, concludes that the prognosis is by no means hopeless, and that in many cases more active intervention would have been preferable to the course taken, because many autopsies have shown that surgical treatment could have been carried out and might have succeeded. Loison maintains that the symptomatology of wounds of the heart and pericardium is no more obscure and uncertain than is the symptomatology of abdominal wounds.

---

[1] Podrez, in Revue de Chirurgie, May 10, 1899.

[2] Burrell, in International Text-book of Surgery.

[3] H. C. Wyman, in Medical Monograph, June 15, 1899.

[4] Revue de Chirurgie, 1899, Nos. 1, 2, and 3.

[5] Giornale internazionale delle scienze mediche, January 15, 1899. Extract in New York Medical Journal, March 11, 1899.

Hemorrhage may be arrested by syncope, but syncope may itself prove fatal. Podrez says that the situation of the external wound is very important in making a diagnosis of heart injury. The usual symptoms and signs, according to Podrez, are fainting, shock, free external hemorrhage, oppression of respiration, and irregularity of the pulse, which is also rapid and weak ; increase in the area of cardiac dulness, vomiting, tremor, convulsive seizures, and possibly transitory hemiplegia.[3] Podrez tells us that the shock is a secondary result of the wound in the heart, and should not be treated until the wound in the heart has been sutured. It is not proper to wait for reaction before operating. If the surgeon waits the precious opportunity will probably be lost.

In the diagnosis of heart wounds the following points are important: Shock, situation of external wound, the form of instrument causing the wound, probing the wound (which Rehn approves of if carefully done), pulsation in the outer wound, symptoms of hæmopericardium and hæmothorax.[4] I agree with Burrell, who says :[5] "An exploratory operation is advisable in any case where a wound of the heart or pericardium is suspected, for the following reasons : 1. To secure asepsis. 2. To prevent the outpouring of blood from a possible wound in the heart-muscle into the pericardium, and by that means supradistending the pericardium and stopping the heart's action."

A. Podrez[6] lays down the following rule of procedure : In every case of penetrating wound of the pericardium in which there are signs of hemorrhage or cardiac compression, the surgeon must expose the seat of injury by a large incision and by resecting a portion of the wall of the thorax. He should then explore the pericardium, and if the pericardium is wounded, the heart. The operation, Podrez says, is often very difficult. Many of the patients are so weak that it is not proper to anæsthetize them, and it may be necessary to suspend the operation for a brief period from time to time. A patient may die just as sutures are being passed through the heart-substance. In some cases, Podrez says, the difficulties are so great that the operation must be abandoned.

---

[1] A. Podrez, in Revue de Chirurgie, May 10, 1899.

[2] Bulletin de l'Académie de Médecine, Paris, July 4, 1899.

[3] Revue de Chirurgie, May 10, 1899.

[4] Editorial by James P. Warbasse, in Annals of Surgery, November, 1898.

[5] International Text-book of Surgery.

[6] Revue de Chirurgie, May 10, 1899.

In cases in which the pericardium is found full of clots the coagula should be removed, and then if the pericardium continues to fill with blood, and the blood is not from an intercostal vessel or from the internal mammary artery, search should be made for a heart wound.[1]

The incision recommended by Podrez extends from a point in the second intercostal space one and one-half inches to the left of the margin of the sternum, to the mid-sternal line. It is then carried vertically downward in the mid-line of the sternum. At the fifth costo-sternal articulation the incision is curved outward so as to follow the fifth costal cartilage. The mediastinum is opened at the level of the fifth costo-sternal articulation. With bone-cutters the sternum is cut up in the line of the skin incision, and at the level of the second interspace the bone is cut transversely and toward the left side. This flap is lifted up. Podrez considers it wise, if possible, to separate the periosteum of the lower surface of the sternum before cutting the bone. This precaution is taken to avoid injuring the pleura. The pleural cul-de-sac should be drawn outward before lifting the flap.

Weber[2] insists that the heart must be exposed by a very free opening in the chest-wall.

Wyman approves of an incision in the fourth interspace, beginning near the sternum and passing upward for three inches, the fourth costal cartilage being separated from the sternum and pulled outward to give room. He says if it becomes necessary to divide the third costal cartilage an incision should be made parallel with the sternum and one inch from it, and almost at right angles to the first incision. He also says that the index finger should be passed beneath the apex of the heart to raise the organ and steady it while sutures are being passed.[3] Rehn brings the heart anteriorly by drawing on the pericardium.

The *Centralblatt für Chirurgie*, October 28, 1898, takes note of some important experiments made at Breslau on the surgery of the heart.[1] The experiments were made on rabbits and dogs. It was found that nearly one-half of a ventricle could be excised after applying a tobacco pouch suture above. Several animals recovered after the lower part of the heart had been separated in two pieces and sutured. These experiments show that there is greater hemorrhage after wounds of the right than of the left ventricle, and that sutures must be tied during diastole, for if tied during systole they will tear out.

---

[1] Wyman, in Medical Monograph, June 15, 1899.

[2] Centralblatt für Chirurgie, 1899, No. 27.

[3] Wyman, in Medical Monograph, June 15, 1899.

Rehn shows in a series of experiments that primary bleeding is systolic, but the secondary hemorrhage which has been noted in nearly every case is diastolic in occurrence. He says the other elements which disturb the circulation and the action of the heart are the filling with blood of the pericardial sac, and the influence of the wound of the pleura or lung which usually coexists with a heart wound.[2]

Small wounds gap but slightly. Large wounds gap markedly, the degree of gaping depending on the relation of the wound to the muscular fibres. Wounds of the right ventricle bleed more than wounds of the left ventricle. Rehn maintains, and Riedel agrees with him, that in hæmopericardium the heart is not dislocated backward, but lies in close relation to the chest, and he concludes that puncture of the pericardium for effusions is a dangerous procedure. In regard to exposure of the heart, Rehn says that temporary resection of the fifth and fourth ribs of the left side near the mammary line, the flap being turned back upon the sternocostal joints, exposes the anterior surfaces of the right ventricle and a large part of the left ventricle. Resection of the third and fourth ribs of the right side and a part of the sternum with turning back of the flap exposes the right auricle. Giordano[3] says that the method used must be rapidly executed, must secure a large opening, and should require but few assistants. He points out that the anterior and lateral walls of the ventricles and sinuses can be reached from the front. The posterior surface of the ventricles is accessible by going through the posterior lateral wall of the chest. He says one of the ventricles can be sutured anteriorly after resection of the fourth or fifth rib without resecting a part of the sternum. To reach the auricles, Giordano resects the third and fourth ribs, makes a quadrilateral opening, and reflects the ribs at the chondrosternal junctions.

H. C. Wyman[4] reports a case in which the pericardium was sutured. A bursting circular saw had torn away two inches of the patient's fifth rib of the left side, and also one and one-half inches of the fifth costal cartilage. The pericardium and pleura were torn, and the apex of the heart protruded. The openings in the pericardium and pleura were closed with continuous catgut sutures, and the patient recovered.

---

[1] Extract in Journal of American Medical Association, December 10, 1898.

[2] Rehn on Suturing of Penetrating Wounds of the Heart. Edirorial by James P. Warbasse in Annals of Surgery, November, 1898.

[3] La Riforma medical, October 15, 1898, abstract in Lancet,

[4] Physician and Surgeon, October, 1898,

If the pleura has been opened in such a case the Fell-O'Dwyer apparatus may be of much service in preventing pulmonary prolapse from acute traumatic pneumothorax.[1]

Some surgeons believe that in gunshot wounds of the heart death takes place so rapidly that surgical intervention is impossible. Matas says in a previously quoted article: "As to the gunshot perforations of the heart, they will continue, for obvious reasons, to spare the surgeon even the contemplation of his helplessness to relieve them." A. Podrez[2] reports a case which shows that this view must be modified. A girl, aged sixteen years, was shot with a revolver, the calibre of the bullet being No. 32. She was brought to the hospital two hours later in a condition of profound shock. The heart-beats were inaudible, and the area of cardiac percussion dulness was increased toward the right side. The penetrating wound was near the fifth costosternal articulation. During the next forty-eight hours the condition of the patient improved, but at this time symptoms arose pointing to a fresh hemorrhage into the pericardial sac. The patient was given ether, and a grooved director was introduced into the wound and carried along gently until it touched the heart. Several ounces of turbid fluid came away. The condition of the patient was improved by the operation. Next day there were renewed symptoms of hemorrhage, and radical interference was decided on. A flap was lifted from the chest-wall, and the heart was exposed. The pericardium was irrigated with boric acid solution, some false membrane was stripped off the heart, and a bullet wound was found in the right ventricle. The wound was longitudinal, and about one inch from the cardiac apex. An attempt was made to introduce a grooved director into the wound, but the track was found to be occluded by muscular fibres. A needle was pushed into the ventricle at least ten times in the hope of locating the foreign body. The pericardial cavity was carefully explored, and finally the heart was grasped by each hand and palpated. The bullet could not be detected. The pericardial cavity was packed with gauze. For three weeks there was a purulent discharge, which was only profuse during the first week. At the end of three weeks packing was discontinued, and a tube was used. This patient recovered completely, and was well five months after operation. A fluoroscopic examination showed the foreign body lodged in the heart. This situation was ascertained certainly, because the bullet moved with the rhythmical contractions.

---

[1] See Matas' views in article on the Lungs and Pleura.

[2] Revue de Chirurgie, May 10, 1899.

Marion[1] reports a case of bullet wound of the heart in which operation failed to save life. He resected the cartilages of the fifth, sixth, and seventh ribs, and opened the pericardium, which was full of blood and clots. The removal of the clots was followed by violent bleeding from a wound in the ventricle, and the patient died almost instantly. The wound was too large to permit of rapid suturing. Post-mortem examination showed that the ball had passed through the heart.

Pagenstecher[2] says there are on record ten cases of operations for penetrating wounds of the heart, and six of these cases recovered. Such statistics are distinctly encouraging when we reflect that it is almost certain that without operation each one of these ten cases would have died. Fischer's table shows that but 10 per cent. of cases recover spontaneously. Pagenstecher, in the above quoted article, reports a case of stab wound of the heart in a male, aged seventeen years, who when brought into the hospital was in extreme shock ; there was no external bleeding from the wound, and there were signs of hæmothorax. The absence of external bleeding in this case should be noted, because Podrez has claimed that external bleeding is a valuable symptom of wounds of the heart. The patient was placed under the influence of ether sixteen hours after the injury. A portion of the sixth rib was excised, the wounds in the pleura and pericardium were enlarged, and a wound was discovered in the side of the left ventricle. The edges of this wound gaped slightly, and a stream of blood trickled from it. The wound in the ventricle was sutured. Three deep stitches and one superficial stitch of celluloid thread were employed, and the sutures did not include the endocardium. A Hagedorn needle was used to pass the threads. Suturing arrested the hemorrhage. The ends of the threads were left long, were brought out of the wound in the chest-wall and were employed to secure drainage. The pleural wound was enlarged considerably. A great quantity of dark-clotted blood was evacuated, when clear red blood poured out. The entire pleural cavity was packed with gauze, the lung being made to retract in this way. The hemorrhage was arrested and the wound in the pericardium was closed with catgut sutures. The patient recovered, and was well ten months after the injury.

Ramoni[3] reports a case of stab wound of the heart. The man was much collapsed. A flap was raised from the chest-wall, the pericardial wound was enlarged, and two bleeding wounds were found in the left ventricle. The wounds were sutured. Ramoni found the suturing difficult, because the passage of the needle caused violent cardiac contractions, and these contractions tended to tear out the stitches and enlarge the wound. This patient recovered. Ramoni strongly favors operation, and shows that few such patients recover without operation, and that of those who do recover many subsequently develop organic cardiac disease.

---

[1] La Presse Médicale, March 29, 1899.

[2] Deutsche medicinische Wochenschrift, August 10, 1899.

[3] Gazetta degli Ospedali, May 14, 1899.

G. Parlavecchio[1] reported a case of penetrating wound of the heart. The man had been stabbed in the fifth interspace, to the left of the parasternal line of the left side, and after receiving the injury had walked more than two hundred yards to the hospital. When seen, five hours later, he was found to have hæmopneumothorax of the left side, and there were also signs of hæmopericardium. Eight hours after the injury chloroform was administered, a portion of the fifth rib of the left side was resected, and there was found a wound in the pericardium and a V-shaped wound of the heart near the apex. The cardiac wound entered the cavity of the left ventricle, and blood flowed from it intermittently. Four silk sutures were passed and tied, and the hemorrhage was controlled. The pericardium was sutured and the intercostal wound was closed. This patient recovered, the third case on record, Parlavecchio says, of recovery after suture of the heart.

E. Giordano[2] records the first instance of successful suture of a wound penetrating the left auricle. The wound was three-quarters of an inch in length, and two hours elapsed between the time of injury and operation. The condition of the patient was so desperate that there was not time for careful antiseptic preparations. The wounds in the heart and pericardium were sutured. The patient died two weeks later from septic pleuritis. The necropsy showed that the patient had recovered from the cardiac wound, which was soundly healed.

The above reports of cases in which surgical intervention has been practised in injuries of the heart and injuries and diseases of the pericardium are sufficiently encouraging to make us hopeful for the future. In fact, in the light of this experience, if brought in contact with such cases, surgical intervention becomes our solemn duty unless the case presents some positive contraindication. As Ninni says,[3] "Systematic abstention has no raison d'être in penetrating wounds of the heart."

Pericardial Effusion. TREATMENT. There are several surgical methods of treating a pericardial effusion. The pericardial sac may be tapped; it may be incised; it may be opened after resecting a piece of a rib.

Brentano maintains positively that tapping is dangerous, and holds that there is no accurately determined and fixed space where the pericardial sac can be tapped without the risk of wounding the heart or the pleura. Brentano says the heart is in much danger during tapping, because he thinks that in cases of pericardial effusion the heart is not pushed backward, but is rather lifted forward against the wall of the chest.[1]

---

[1] Lancet, September 17, 1898.

[2] La Presse Médicale, September 9, 1898.

[3] New York Medical Journal, March 11, 1899.

This view of the position of the heart in pericardial effusion is in accordance with the teachings of Rehn and Riedel as to the position of the organ in hæmopericardium. It is a question if it be possible to completely drain the pericardial sac by puncture. The proper method of draining the pericardium is to resect a portion of a rib or a rib cartilage and incise the pleura. Brentano opposes simple incision, and maintains that if it is practised either the internal mammary vessels or the pleura may be damaged. He employs local anæsthesia, resects the fifth left costal cartilage, punctures the pericardium to determine the nature of the fluid, incises the pericardium, and in some cases sutures the edges of the incised pericardium to the margins of the skin wound. The advisability of irrigating in these cases has been much questioned. In non-purulent effusions it is surely unnecessary. In purulent effusions I would be inclined to irrigate with hot normal salt solution. Brentano irrigates in such cases with sterile water in order to remove clots and masses of fibrin. We should bear in mind Brentano's warning against operating if the patient has had cardiac disease for a long time.

SUPPURATIVE PERICARDITIS. Henry Betham Robinson[2] recently operated on a case of suppurative pericarditis. The patient was a boy, aged four years. Robinson made an incision parallel to and over the fifth left costal cartilage, removed an inch of the cartilage, and incised the pericardium. Ten ounces of purulent fluid gushed out. The cavity was not irrigated, but a gauze drain was inserted. The patient died three days later of bronchopneumonia. The pericardial pus, on cultivation, gave an almost pure culture of Friedländer's pneumococcus. Robinson considers it probable that successful cases of pericardial drainage are more apt to be published than are unsuccessful ones, and thus the apparently favorable statistics are explained. Such cases are undoubtedly extremely dangerous. Brentano, in reporting the statistics of Körte's clinic, says five cases of pericardial effusion were treated. Only one of these cases recovered absolutely, although each case was benefited by the operation. The case which recovered was of rheumatic origin. The two purulent cases resulted from osteomyelitis.

Aneurism of the Aorta. TREATMENT. It is sometimes possible to cure a sacculated aneurism of the aorta by medical means. Valsalva's method, which consisted of almost starving the patient and bleeding him repeatedly and profusely, has been completely abandoned. It produced a dangerous degree of cardiac irregularity. Tufnell's method has occasionally, though rarely, succeeded. This method consists of perfect rest in bed and restriction of the diet, particularly of liquids. The patient is kept as nearly quiet as is possible, and thus the heart-beats are reduced from fifteen to thirty per minute, or from over 20,000 to over 40,000 a day. Tufnell advised the following diet: Breakfast, two ounces of bread and butter and two ounces of milk; dinner, three ounces of meat and four ounces of milk; supper, two ounces of bread and two ounces of meat. Such a diet greatly reduces blood-pressure, and thus favors coagulation within the aneurism. It is necessary to persist in the treatment for many weeks or for several months if we hope to obtain a cure. It is customary to administer iodide of potassium, and this drug seems to be of some benefit, particularly in modifying pain. The use of iodide of potassium might seem to be indicated because of the alleged influence of syphilis in the production of aneurism. This influence of syphilis is believed by some to be certain. For instance, Etienne shows that out of 376 cases of aneurism in various situations 70 per cent. gave a distinct history of syphilis. On the other hand, Hare and Holder[1] in a series of 953 cases of aortic aneurism found 334 where a positive history as to the presence or absence of syphilis was given, and of this number but 52, or 15.5 per cent., had syphilis ascribed as the cause of the aneurism. Out of Puppe's sixteen cases of aortic aneurism seven showed positive evidences of syphilis. The influence of syphilis is said to be particularly manifest in aneurisms occurring in the young. However, it is certain that the arterial changes ensuing upon syphilis are not themselves syphilitic in nature. As Fournier says, they are not syphilitic but parasyphilitic, and there is no particular reason why parasyphilitic processes should be improved by iodide of potassium. As a matter of fact, iodide of potassium is of no more service in an aneurism which follows syphilis than in an aneurism occurring in a person who never had syphilis.

---

[1] Deutsche medicinische Wochenschrift, August 11, 1898.

[2] British Medical Journal, November 26, 1898.

If the patient will not submit to the prolonged and wearying rest-treatment, if he is apparently unable to fulfil its conditions, or if the treatment fails, and if the aneurism is single and sacculated, surgical treatment should be considered. Distal ligation has occasionally succeeded. The ligature may be applied to the right or left subclavian, to the right or left carotid, or to both the carotid and subclavian of the right side. Heath maintains that in the left side ligation of only one vessel is safest. Distal ligation is not usually to be employed if there are other aneurisms, because in such a case the operation may cause them to distend with rapidity. In a recent case in the Jefferson Medical College Hospital a man was found to have an aneurism of the innominate artery and also an aneurism of the common carotid on the right side. The carotid was exposed by incision, and was found diseased between the innominate aneurism and the carotid aneurism. It became evident that a ligature could not be placed with safety between the two aneurisms so as to be proximal to one and distal to the other. A ligature was placed upon the carotid distal to both aneurisms, and the third part of the subclavian was also ligated. This case has been notably improved, but the operation was done so recently that the ultimate result cannot be estimated. When to operate and where to operate were discussed in some detail in PROGRESSIVE MEDICINE last year.

---

[1] American Journal of the Medical Sciences, October, 1899.

The introduction of wire into the sac has been employed in a number of cases, and in some cases galvanism has been used after the introduction of wire. Several very gratifying results have been placed on record, but there is much difference of opinion as to the real value of the method. For instance, F. D. Tait[1] reported a case of aortic aneurism treated by this plan. He introduced twelve feet of silver wire (No. 28). Soon after the operation the pain and dyspnœa abated markedly. The patient lived for two hundred and ninety-seven days after the operation, and died of renal insufficiency. The post-mortem examination disclosed an aneurism as large as a fœtal head, involving the ascending and part of the transverse arch of the aorta. The silver wire was chiefly in the centre, and there were several soft clots around it, and on two of the strands were old clots. A portion of the wire had approached within one centimetre of the aortic valves. Tait does not believe that this operation is safe ; he considers it unscientific, and predicts that it will soon be abandoned. The apparent improvement in his case was due, he says, to morphine.

D. D. Stewart[2] strongly advocates the method, and reports several cases greatly benefited by the operation. One man lived for a year after operation and returned to his work. He died suddenly in California, and there was no post-mortem. One man died suddenly on the fifth day after operation by this method on an aneurism of the abdominal aorta. No post-mortem. Another case died suddenly eight and one-half months after operation. Another case of abdominal aneurism died nine months later of dysentery. Another patient was greatly benefited and was still living when the report was made. Stewart maintains that if the operation is done correctly on selected cases it strongly tends to produce clot formation, and may solidify the aneurism. He says the operation has a value " beyond all other operative procedures now in vogue."

---

[1] Pacific Record of Medicine and Surgery, September, 1898.

[2] Philadelphia Medical Journal, November 12, 1898.

I believe the introduction of wire and electrolysis is the proper treatment in a sacculated aneurism which is not enormous, and in which the opening into the artery is not believed to be of very large size. It has some dangers, but little shock follows it, and it is apparently not highly dangerous and is safer than distal ligation (in eleven cases of distal ligation reported by Küster five died within ten days). It offers a fair chance of obtaining great and even protracted improvement. Stewart maintains that a number of cases have resulted in failure because of faulty technique, especially the introduction of excessive quantities of wire which interferes with the contraction of an organized clot, and which may even lead to perforation of the sac. Stewart shows, too, that the wire should not be unduly firm nor should it be so firmly drawn that it is likely to break.[1] He introduces into the sac, under the strictest antiseptic precautions, fine coiled wire, " previously so drawn that it may be readily passed through a thoroughly insulated needle of somewhat larger calibre than the wire, and, after introduction, assumes snarled spiral coils." Stewart also says that in suitable cases a moderate amount of wire occupies the entire calibre of the sac. Of course this will not take place if the sac is full of clots or is of great size. Steel and hard-drawn iron are too brittle materials ; they may fracture as the sac contracts and cause rupture. Soft iron will decompose and form insoluble salts under the influence of the current, and may be responsible for embolism. The wire should be of silver, gold, or platinum, and the amount required must be nicely calculated. A globular sac three inches in diameter requires from three to five feet ; a sac of from four to five inches in diameter from eight to ten feet.[2]

" The anode or positive pole should invariably be the active electrode. This is connected with the wire, and the negative rheophore, a large clay plate or an absorbent cotton pad of equal dimensions, made after the method of Massey, is placed upon the abdomen or the back. The current is slowly brought into circuit and its strength is noted by an accurate milliampère meter. The increase is gradual for a few moments until the maximum strength supposed to be required is reached. It is maintained at this until the approach of the end of the session, and then gradually diminished to zero, after which the wire is separated from the battery, the needle carefully withdrawn by rotation and counterpressure, and the released external portion of the wire gently pulled upon and cut close to the skin, the cut end being then pushed beneath the surface. This latter procedure is facilitated by using care in the introduction of the needle to first draw the skin at the site of puncture a trifle to one side, in order to procure a somewhat valve-like opening.

---

[1] Philadelphia Medical Journal, November 12, 1898.

[2] Ibid.

"Experience has shown that the current's strength must be rather high—from 40 to 80 ma.—and the session long—from three-quarters of an hour to one and a half hours. Thus used, the following effects may be expected: As before remarked, the mere introduction of coiled snarled wire, without the conjoint use of galvanism, if practised judiciously, is in itself a method of value, since the presence of wire, if engaging all parts of the sac, acts both as an impediment to the blood stream and at the same time offers to the eddies set up multiple surfaces for clot-formation. Hence, this method had more to commend it than that by mere galvano-puncture with needles. By galvano-puncture, although firm coagula are produced, they are of such trifling dimensions and engage such small areas of sac-wall that without impeding in the least the blood current their dissolution rather than their accretion quickly follows. By the application of a strong galvanic current through coils of wire, so disposed that all areas of the sac are reached, it follows without exception, as has been noted in all recorded cases, that consolidation by virtue of clot-formation is promptly and invariably produced. The solidification is rapid and is generally manifest before the end of the electrical session through changes apparent to the eye and the hand, in the pulsation, and in the degree of consistence of the sac-wall. These changes become more decided in the course of a few days, until, after a time, in the most favorable cases, a hard nodule, with a communicated pulsation only, replaces the previous expansible tumor. This was the history of four of the ten cases now recorded."[1]

Subclavian Aneurism. Ligation of the First Part of the Subclavian. Some of the highest surgical authorities oppose this operation. Jacobson says it is very doubtful if ligation of the subclavian in the first part of its course will ever be a successful operation. Erichsen considered ligation of the subclavian in the first part of its course an operation which should "be banished from surgical practice." As a matter of fact, Halsted ligated the first portion of the subclavian artery of the left side, and extirpated a subclavian axillary aneurism, and the patient recovered. Schumpert successfully ligated the first portion of the left subclavian for an aneurism in the third part of the vessel. H. W. Allingham,[3] in a case of aneurism which sprung from the third part of the vessel on the right side, ligated the first portion of the artery. The patient lived, but pulsation was not arrested. Thirty-eight days after the operation Allingham resected the clavicle, exposed the sac, and extirpated the aneurism. During the operation the subclavian vein was torn, but a lateral ligature arrested the bleeding. The patient recovered, and a month after the operation there was pulsation in the brachial at the elbow and in the radial at the wrist.

---

[1] D. D. Stewart, in Philadelphia Medical Journal, November 12, 1898.

[2] Lancet, June 3, 1899.

THE SKULL AND BRAIN.

Methods of Opening the Cranial Cavity. The cranial cavity may be opened in different ways: 1. By the ancient operation of trephining. 2. By the use of the gouge or chisel. 3. By the use of saws (Hey's saw, the Gigli saw, or the circular saw of the surgical engine).

TREPHINING. The ancient operation of trephining still holds its own among more modern methods. It is a slower but a safer operation than some other plans, and does not inflict harmful jars upon the cranial contents. The instrument usually employed is the hand trephine. The boring of a thick skull with this instrument makes the hand tired and tremulous, hence the surgeon should permit his assistant to do the boring in order that his (the surgeon's) hand shall be steady for the performance of necessary intracerebral manipulations. The old brace-trephine, or trepan, is now rarely employed. It permits of more rapid operation, but is less controllable, and is apt to break through the inner table unexpectedly and forcibly and injure the brain. In a thick skull time could be safely saved by boring through the outer table with a brace-trephine and completing the operation with a hand trephine. The trephine opening is too small to permit of much intracerebral work being done through it. It is true that a large trephine may be used, but owing to the curved and irregular surface of the skull it is extremely difficult to trephine with a large instrument. If the opening is sufficient for our purposes the button of bone, which has been kept in a warm sterile salt solution, may be replaced. If it is necessary to enlarge the opening, or if packing must be inserted, or if drainage is required, the button cannot be replaced. Enlargement of the opening is effected by gnawing away the edges with rongeur forceps. If the button is not replaced the defect will, in most instances, be permanent, and the gap will fill up with a dense membrane which may in some cases partly ossify. Some surgeons warmly commend the replacement of the button, believing that it continues to live and becomes quickly attached to surrounding bone. Others attach little importance to it, as they think the button quickly dies. The experiments of Max David[1] sustain the view that living bone if implanted to fill an osseous defect will continue to live and will unite to adjacent bone. David opposes the view of Barth that transplanted bone always dies, is of no more use than dead bone or ivory, and acts merely as a framework or support for granulations. Some advocate closing the defect by strewing the surface of the dura with small pieces cut from the button (Macewen). Senn employs decalcified bone, which is gradually absorbed, new bone taking its place. König employs a flap composed of scalp, periosteum, and the outer layer of the skull. Some surgeons have used plates of celluloid (Roswell Park).

---

[1] Archiv für klinische Chirurgie, Band lvii.

Max David shows that after the implantation of living bone, dead bone, or ivory, healing of the wound in the soft parts will take place by primary union, regardless of the material implanted. Dead bone is absorbed and replaced by new bone. Living bone is vascularized from adjacent parts and lives. According to David, ivory becomes united to surrounding bone in about eight weeks, dead bone in about one week. At the end of eight weeks transplanted dead bone can hardly be distinguished from adjacent healthy bone. In this process David maintains that giant-cells come from the pericranium, bone, and dura, enter the implanted dead bone, eat out cavities, and into these cavities enter granulations, the adventitious cells of which subsequently ossify.

Barth has reached the conclusion that in order to obtain bony closure of a defect abundant calcareous salts must be furnished. In experimenting upon animals he closed osseous defects by the implantation of sterilized calcined spongy bone. He succeeded by this method in filling up an osseous defect in the tibia of a man.

Grekoff[1] has employed the method of Barth twice with success. Both of the patients were young children, and each had a cranial defect resulting from operation performed because of injury. Grekoff calcined the scapula of a calf and implanted a portion after freshening the edges of the living bone. In one instance the calcining had not been complete, and it became necessary to remove a few fragments. While effecting the removal he was able to see that the charred bone had been replaced by healthy bone. Both patients are well, and the gaps are solidly closed, one five months and the other seven months after the operation. Grekoff believes that the calcined bone acts as a support or skeleton, in which the new growth develops from the bone-margins. The advantages of calcined bone are that it is easily penetrated by cells and granulations, and is rapidly absorbed.

The views of Grekoff agree with the opinions of Sworykin.[2] Sworykin experimented by trephining the skulls of rabbits and inserting plates of various materials (phosphate, carbonate and sulphate of lime, with gelatin, dead cartilage, living cartilage). Some time after the performance of each operation an examination was made. It was found that granulations grew from the sound bone toward the centre of the graft, that the foreign material was absorbed, and that the granulations were converted into connective tissue and finally into bone. Sworykin estimates the duration of the process, if artificial plates are employed, as one year and a half. It is much more rapid if cartilage is used.

---

[1] Centralblatt für Chirurgie, October 1, 1898.

[2] New York Medical Journal, October 8, 1898, from Vratch, 1898, No. 25.

Osteoplastic Resection. In this operation an omega-shaped flap is formed, all of the soft parts being divided. The bone is chiselled through in this line, and a deep groove is cut with a sculptor's chisel along the sides and summit of the flap. The blows are delivered with a wooden or metal mallet, and the chisel should be held obliquely when the blows are struck to limit concussion. When the inner table is exposed the division is completed with an osteotome, the hammer or mallet being used lightly. The flap of bone is wedged up until the base fractures, when it is lifted out, remaining attached to the scalp. This flap of bone and soft parts is attached to the scalp by a pedicle of soft parts as a trunk-lid is held to a trunk by a hinge. After the completion of an operation the bone is replaced and the soft parts are sutured.

Constant vigilance must be exercised during the operation to prevent stripping of the soft parts from the bone-flap. If this occurs and the loose bone is transplanted, so large a piece will be apt to necrose rapidly and make trouble. This operation often gives most satisfactory results.

Some surgeons believe that the blows of the hammer may produce serious or dangerous concussion. The inner table may be fissured or extensively fractured by the use of the hammer and chisel, and in one reported case an abscess of the brain was ruptured by the blows (Salzer's case). In a thin skull the operation requires considerable time, but is not difficult. It is carried out most easily if the base of the bone-flap is thin, as it will be if in the temporal fossa. If the bone is thick the operation requires a great deal of time; much hard hammering is necessary, and it is very difficult to break the base of the flap. Keen suggests that if the operation is not in a region where the skull is certain to be thin we should determine the thickness of the base of the flap by making a small trephine opening at one tip of the omega. If the skull is found to be thick another opening should be made at the opposite point of the omega, and the base of the bone-flap should be divided with a Gigli wire saw. Keen ties the saw to a probe, carries the probe into one trephine opening, pushes it between the dura and the bone, causes it to emerge from the other trephine opening, extracts it, and draws the saw with it. A handle of a chain saw is fastened at each end of the Gigli saw, and the bone is rapidly divided without any risk of injuring the dura. Lauenstein[1] passes the Gigli saw as follows: To one end of a watch-spring the saw is fastened. To the concave side of the other end of the watch-spring a small roll is attached, which acts like the wheel on a barrow. The spring and roll are introduced through one trephine opening, and the spring is carried along to the next opening, through which it protrudes. Lauenstein formerly employed the watch-spring alone as a guide, but he finds the roll of great service when, because of high intracerebral pressure, the dura is very tense and resistant to the unguarded watch-spring. Lauenstein approves of the suggestion of Zander, that if the skull is very thick the edges of the openings should be bevelled, in order to facilitate the emergence of the spring.

An osteoplastic flap can be cut with the wire saw. A number of trephine openings will be required, because the wire saw will not cut easily across broad pieces of bone. The operation is satisfactory, can be as rapidly performed as with the chisel and mallet, is free from the dangers of concussion which go with the latter method, and enables us to bevel the bone-flap and thus secure a shelf for it to rest upon after replacement. Podrez[2] sets forth the following technique: The instruments required besides knives, forceps, etc., are the wire saw, a drill or trephine, and a conductor. The conductor is a piece of watch-spring, one end of which is a ring, the other end being olive-shaped and perforated with a small hole through which is threaded a piece of silk. The drill is used to bore holes at the corners of the square portion of skull which is to be resected. One end of the silk is tied to the saw and the other end to the conductor. The conductor is passed from one opening to another, the saw is drawn through, and an end is lifted out. The portion of bone is sawn through, the conductor remaining in position to guard the dura and brain from injury by the saw. The dural surface of the flap is sawed through, and when the flap is sprung open the outer table of the base is broken. Podrez points out that the openings should be large enough to admit the saw without trouble, and that the introduction of the conductor will be less troublesome if the holes are bored at an angle of 45° to the surface of the bone than if bored at a right angle to it.

Adhesions after Brain Operations. After an operation upon the brain, adhesions form and glue together the brain and its membrane and possibly also the scalp. Adhesions often produce the most disastrous consequences, and may completely ruin the good results of operations. In order to replace a loss of dura or to prevent adhesions between the dura and brain, Beach, Tiffany, and Estes have advocated gold-foil. Abbe, in a case of epilepsy accompanied by adhesions between the dura and brain, separated the adhesions, introduced a piece of rubber tissue beneath the dura and sutured the dura over it. One year afterward the patient was free from trouble. If a portion of dura has been lost Keen suggests that the defect may be filled by cutting a pedunculated flap of periosteum, twisting it so as to turn its under surface upward and fastening it in this position to the margins of the dura. Leonard Freeman[1] is not satisfied with any of these methods. He considers Keen's plan to be troublesome and unsatisfactory, and says that gold-foil and rubber tissue become surrounded by connective tissue and lead to the formation of more extensive adhesions than would have been produced if such a foreign material had not been used. Besides this, Freeman points out that gold-foil is apt to crack and separate into small pieces, rubber tissue eventually disintegrates, and any foreign body is liable to lead to suppuration, and when this occurs the material must be removed by operation. Freeman suggests the use of the lining membrane of the egg-shell for the purpose of preventing adhesions after brain operations. This membrane is thin, tough, compact, and durable, and has been used to close perforations in the tympanum, where it will remain for many months. Freeman says that the interior of a fresh egg is sufficiently aseptic. Some German surgeons suggest that the egg should be boiled. Freeman took a fresh egg, scrubbed it and rendered the surface sterile in corrosive sublimate solution, opened it and exposed the lining of the shell. Animals were trephined, portions of the membranes were destroyed, and the brains were lacerated. Egg membrane was inserted into the openings and the scalps were sutured. The animals were killed after varying intervals. In some cases the membrane was found intact; in other cases it was replaced by newly-formed dura. In no case was the scalp adherent to the brain. In one case microscopical investigation showed that the egg membrane had been replaced by adipose tissue containing bloodvessels, and underneath this was a layer of delicate connective tissue. Freeman, with justice, claims that his experiments indicate that egg membrane is not really a foreign body, but tends to become incorporated with surrounding tissue without the production of perceptible irritation and without the formation of any marked cicatrices. Eventually it becomes absorbed, but remains intact a sufficient length of time to prevent adhesions. It does not predispose to infection. I have not as yet used this method within the skull.

---

[1] Centralblatt für Chirurgie, 1899, Band xxvi., S. 257.

[2] Ibid., January 28, 1899.

In a case at the Jefferson Medical College Hospital, in which the median nerve was exposed by a cut, one of the clinical assistants, Dr.

---

[1] Annals of Surgery, October, 1898.

Joseph Coles Brick, covered the exposed nerve with egg membrane and sutured the parts above the nerve. Primary union was obtained, and there has not been a particle of adhesion between the nerve and the scar.

Head Injuries. In times past trephining was employed many times for every possible variety of head injury. Surgeons became infatuated with the operation, and would sometimes perform it more than once on the same individual. In the sixteenth and seventeenth centuries the operation was practised most extensively, and the men who made a sort of specialty of it were called trepannists. Hyrtl has congratulated the profession that "the grass has grown long" on the graves of these individuals. The proceedings of a typical trepannist are quoted in John Bell's *Treatise on Surgery* from the book of Godifredus, of Holland. The trepannist alluded to bored twenty-seven holes in the skull of Philip, Count of Nassau. The most remarkable part of the story will be found in Robert Liston's *Lectures on Surgery*. In this book we learn that the Count published a certificate stating that "Mr. Henry Chadborne trepanned me twenty-seven times, and did well and soundly cure me." Abernethy and Desault headed a reaction against the indiscriminate use of the trephine, and surgeons generally gave up operating for simple fracture without cerebral symptoms whether there was depression or not, and many gave up operating for simple fracture even if cerebral symptoms existed, and in compound fracture with impaction. Like all reactions, it went too far, and the fear of making the fracture compound dominated opinion. These operations strongly attracted surgical interest. In an editorial in the *Boston Medical and Surgical Journal*, October 20, 1898, there is a consideration of "Head Injuries and their Treatment." In this article it is well said that "The vicissitudes of the trephine constitute one of the most interesting chapters in surgical history. From the days of Bérenger de Carpi and his contemporary, Ambroise Paré, down to our own—a period of over three centuries—the cranium and its contents have offered a most attractive field to the surgeon.

"The secret of this attractiveness lies in the startling eccentricity of course pursued by pathological processes within the cranium, especially of those of traumatic origin. Even the earliest observers of experience were cognizant of the tendency in cases of the latter sort, of least apparent moment, to terminate fatally, while the most severe often recovered spontaneously under unfavorable circumstances. The discovery of this treachery on the part of diseased nervous tissue has been an incessant source of irritation to the surgeon, keeping him constantly on the *qui vive* in the effort to outwit nature by strategic operations. How one-sided the struggle has thus far been is painfully obvious to one who has the opportunity for examination of its *unpublished* records."

The uncertainty as to the termination of head injuries was well put by Pott when he said : "No injury of the head is so slight as to be disregarded or so severe as to be despaired of."

The introduction of Listerism made operations upon the skull and brain vastly safer, and led surgeons to again become more radical. The danger following the conversion of a simple into a compound fracture by operation—a danger much dwelt upon and fiercely debated in former days—has been infinitely reduced in these days by surgical cleanliness. I believe at the present time too many operations are performed. Operations have become comparatively safe, and this has given to the surgeon a confidence and assurance which may impair his judgment as to when an operation should be performed and when it should be refused. Senn has said, and Stokes has asserted, that on the part of some surgeons there seems even to be blunting of the feeling of genuine moral responsibility.

"Although we cannot but admire the improvement which has taken place in the technique of cranial surgery, yet we cannot help feeling that the very facility of the operation of trephination often leads the surgeon into ill-considered action, and betrays the consulting neurologist into counselling operative interference from which his calmer judgment would dissuade. The difficulty of exact diagnosis, even with our present knowledge, is still great, and the neurologist must often admit in the presence of a given case of craniocerebral traumatism that he is confronted by a combination of circumstances so unique that he occupies very much the same position as does the weather prognosticator in the times when 'all signs fail.' There is no case like a head case to dispel fondly cherished delusions as to the significance of symptoms ; no case like a head case to engender regrets. There is no opportunity to study leisurely the steady invasion of a pathological process, such as a cerebral neoplasm ; there is need, and urgent need, for the keenest diagnostic skill, for the most comprehensive judgment, and often for self-restraint. Historical data are most commonly totally insufficient and untrustworthy, and the neurologist is immediately plunged *in medias res.* Under the stress of circumstances it is easy for the cerebral aspects of the case to dominate the clinical picture and for a fractured liver, spleen, or kidney to fall short of consciousness. On the strength of a dilated pupil, a monoplegia or hemiplegia, the skull is opened and the lesion sought, and if not found at the site of operation the latter is enlarged or a counter-opening made on the opposite side of the head—in an unfortunate majority of cases all to no purpose." [1]

In the above-quoted editorial the query is made as to the propriety of such actions, and as to what can be expected in so limited a field of operation, upon tissue so soft as is the brain, and when multiple lesions are the rule and a solitary lesion is the exception. "In this connection we need but refer to the frequent association of small hemorrhages in or about the motor areas, with abundant hemorrhage, and areas of laceration or contusion in the so-called silent regions of the brain. How easy it is for the former to evoke the predominant clinical phenomena in a given case needs only to be mentioned to be appreciated. Moreover, if the latter had no significance the problem would be reduced to its lowest terms ; but, alas, physiological experiment has demonstrated only too conclusively how little hemorrhage is necessary in the cerebellar chamber (for instance) to produce a quickly fatal result, owing to the pressure discontinuity between this and the other chambers of the brain." The conclusion in the editorial is that the limits of the utility of operation in traumatisms of the head are clearly marked. The writer continues :

---

[1] Editorial in Boston Medical and Surgical Journal, October 20, 1898.

" First of all experience teaches that the fundamental rule governing such cases is not to operate at all until some reaction from the shock of the trauma has taken place. The second rule should be to operate only upon depressed fractures and upon cases which present a reasonable probability of middle meningeal or intracranial hemorrhage so situated that by the evacuation of the clot dangerous pressure can be removed from the brain. It is in these cases that cerebral surgery furnishes brilliant and life-saving results.

" The removal of shattered fragments in compound fractures, and the free drainage of lacerated areas and the cleansing and drainage of septic conditions of traumatic origin, also afford very evident indications for opening the cranium.

" Although to the enthusiastic advocate of trephining the above limitations may seem too narrow, he may be legitimately asked to report any cases which he can safely say were saved by his operation where the conditions were other than those enumerated.

" We have already referred to the danger of laying too much stress upon a monoplegia or hemiplegia in head cases as localizing guides, and we would here urge that too much significance should not be attached to the condition of the pupils, for their variability under identical circumstances is extreme.

" The ' interval of consciousness ' and, where present, the slow pulse of cerebral pressure afford the best signs for our guidance in deciding upon an operation after cerebral traumatism.

" In doubtful cases suggesting hemorrhage, where, owing to alcoholism or the immediate onset of the bleeding, the immediate unconsciousness following the traumatism passes over into the deeper coma, with slow pulse and paralysis from cerebral pressure, and the symptoms grow progressively worse, trephining is again urgently indicated."[1]

I cordially agree with this able editorial in many points, but believe that in combating the pernicious ultra radical stand-point it goes a shade too far. It is true that multiple lesions often exist, but not always. It is true the lesion in the silent area may be doing the fatal work, but the active agent may be the lesion which produces symptoms. Sometimes cases which are apparently desperate, in which the injuries are numerous and extensive, recover after operation. Such cases were reported at the last meeting of the American Surgical Association.[2] I concur in the statement that we should not operate "until some reaction from the shock of the trauma has taken place." That we should only operate for depressed fractures; when there is a reasonable probability of meningeal hemorrhage; for the removal of fragments in compound fractures and the free drainage of lacerated areas and septic conditions, seems a little too narrow. We would bear in mind the wise admonitions of the editorial, and because of most of them, and in spite of some of them, I would formulate the following conclusions:

1. The modern operation of trephining is comparatively safe, and traumatic cases rarely die because they have been trephined and not unusually die because they have not been trephined.

2. If there is a head injury accompanied by cerebral symptoms the surgeon cuts a flap in the scalp, turns it down, and inspects the bone for fracture.

3. In a simple fracture without depression and without distinct cerebral symptoms, do not trephine.

4. In a simple fracture with moderate depressions and without distinct cerebral symptoms, do not trephine.

5. In a young child do not trephine at once for a simple fracture, even with decided depression, if distinct cerebral symptoms are absent, because the depressed portion is apt to be lifted to the general bony level by natural processes. If the depression is not so corrected after a time, operate, or, if the depression is very marked, operate at once.

6. In any person beyond childhood, trephine for a fracture with marked depression even if distinct symptoms are absent. Such a course of action may save the individual from epilepsy or even insanity. This is known as preventive trephining, and it aims to permit of elevation of a depression which, if allowed to remain, might do serious harm.

7. In a simple fracture of the vault with distinct cerebral symptoms trephine for exploration.

---

[1] British Medical and Surgical Journal, October 20, 1898.

[2] Dr. Dudley Allen, in Philadelphia Medical Journal, September 16, 1899.

8. In a compound fracture trephine in order to remove foreign bodies or fragments, arrest hemorrhage, sterilize, and drain.

9. In a puncture or stab through the skull, trephine to permit of exploration, arrest of hemorrhage, disinfection, and drainage.

10. In septic complications or consequences operate for drainage.

To this I would add another rule from Charles Phelps.[1] In fractures of the base not of gunshot origin, and in cases of cerebral contusions "without intracranial hemorrhage or implication of the vault," operation should not be performed.

Above the conviction is emphasized that in some cases the procedure will be different, depending upon whether the patient is an adult or a child. Even a considerable depression in a child is apt to become readjusted, but this does not always take place. B. Merrill Ricketts[2] says: "The delicate bony structure of early life is such as to prevent to a great degree the complete separation of fragments; and while depressions of the cranial bones are many times given an opportunity, and often do readjust themselves, they are many more times permitted to remain depressed."

Ricketts, in the above-quoted article, points out that fractures of the cranium in children are less frequent than plain depressions, and also that fractures of the base are more common than in adults.[3]

Some surgeons have maintained that if trephining is delayed for some time after the injury the mortality in the aggregate will be much less than if it is performed soon after. This was the view of Bluhm. He collected reports of about 900 cases, and concluded that after early operation the mortality is 53 per cent., and after delayed operation 33 per cent. Marshall Clinton[4] questions the accuracy of Bluhm's conclusions. Clinton points out that the statistics collected by Bluhm do not show how many of the patients developed epilepsy or insanity, or what proportion of those who died should be classed as hopeless cases. Clinton advocates early operation.

Retained Foreign Bodies in the Brain. There are cases on record in which foreign bodies in the brain have healed up and have remained for long periods, in some of them without seeming to impair the health of the patient, but in others producing persistent headache, epilepsy, insanity, or abscess. Tillmanns mentions among such bodies points of knife-blades, bullets, fragments of bone, and needles. Von Bergmann quotes Simon as finding, at a necropsy upon a woman, aged seventy-nine years, a needle in the brain, the point of the needle projecting into the lateral ventricle. The inference was that the needle had been forced through the fontanelle in infancy with the intention of killing the child. Tillmanns[1] mentions Bardeleben's report of three cases in which under antiseptic treatment bullets healed in the brain ; cases of bullets healed in the brain reported by Malle, Doutrelepont, and Küster ; Simon's case, before referred to ; Hippert's case, in which a slate-pencil was found in the brain of a man, aged forty-two years, who had been insane for a year ; and Hodge's case of a needle in the brain. L. H. Evans[2] reports the following case, in which a foreign body had been healed up in the brain for thirty-two years. A soldier received a wound on the face in 1862. The wound healed, and the man returned to duty and finished his term of enlistment. A year before Dr. Evans saw him he fell upon a plank and struck himself on the spot where he was previously injured. An abscess formed and was opened, but it continued to discharge for months. A probe, when introduced, came in contact with dead bone. The ethmoidal cells and floor of the cranium were opened through. The dura was found to be swollen, and through a minute opening pus was discharging. A probe when passed through the opening in the dura struck a hard material. This material was removed, and was found to be a bit of wood which had been embedded in the substance of the brain. This piece of wood was one and a quarter inches long and one-third of an inch thick. There was considerable hemorrhage after the wood had been removed, and it was necessary to pack the wound with gauze, which was removed in twenty-four hours. The patient did well for a number of days, but thirteen days after the operation he was seized with a partial paralysis of the same side as that in which the wood had been lodged. He also exhibited paraphasia and developed melancholia. He recovered from the paralysis. In the same paper Evans reports a case in which a knife-blade had been lodged in the left frontal lobe for eighteen months. An operation was performed, the blade was removed, and the patient died in eight days.

---

[1] Medical News, June 3, 1899.

[2] Virginia Medical Semi-monthly, May 26, 1899.

[3] Ibid.

[4] Buffalo Medical Journal, September, 1899.

Influenced by reported cases in which foreign bodies have been healed up in the brain and by a knowledge of the dangers of removal, some surgeons have maintained that foreign bodies, particularly bullets, are not irritant to brain tissue, and are harmless after lodgement. Others admit that lodged foreign bodies gravely menace life, but claim that the removal by operation is more dangerous than is the retention of the body. A. F. Jonas[3] reports a case of compound fracture of the skull, with a considerable loss of brain substance, a large amount of dirt and foreign matter being embedded in the brain. It was impossible to thoroughly remove the dirt, but the patient recovered.

---

[1] Text-book of Surgery, translated by Tilton and edited by Stimson.

[2] American Journal of Surgery and Gynecology, June, 1899.

[3] Western Medical Review, August 15, 1899.

Hahn estimates the mortality of operations for the removal of foreign bodies from the brain at $33\frac{1}{3}$ per cent. Von Bergmann will not operate unless brain symptoms are present.

Charles Phelps[1] combats these conservative views, and disputes the value of some of the evidence on which such views depend. He mentions forty-one recorded cases in which it is claimed that the harmlessness of the lodged bullets was demonstrated by the subsequent history of the patients. He says that at least twenty-five of these cases ought to be rejected, because they are questionable or because sufficient time has not elapsed since the accident. Sixteen cases may be retained and Phelps adds five more, making twenty-one cases. In twelve cases of the twenty-one sepsis arose, and it was directly connected with the presence of the foreign body. In two an operation was performed, and the patients recovered. In ten death occurred, no attempt at removal having been made. Phelps concludes that a retained bullet is a "menace to life not only when associated with osseous fragments but of itself, and it is remarkable that an opposite opinion, supposed to be founded upon actual experience, should have become prevalent." Phelps maintains that wherever a bullet is lodged in the brain substance it will do harm, and will do it quickly, that the percentage of recovery is greater when operation is performed than when it is not attempted, and that the results of operation are much better if interference is instituted early before the origin of septic processes.

In the light of the evidence it would seem that the following is the proper course to pursue: Take an X-ray picture if the patient's condition permits it, and then enlarge the wound in the soft parts, expose the skull, asepticize, and, if the opening in the bone is too small to permit of inspection, enlarge it with the rongeur or by means of the trephine. If the dura is perforated, make a flap in it and so expose the brain. Wash the wound with hot sterile salt soluion and remove any visible foreign bodies, irrigating with salt solution after removal has been effected.

If a bullet has entered the brain we may be able to obtain knowledge of its situation by the use of the X-rays. If the operation is immediately and urgently necessary the ball may be explored for with a probe. Surgeon-General W. F. Stevenson, in his excellent book *Wounds in War*, says: "A bullet which has lodged will probably have traversed the brain and have been stopped by the bone at the other side, and attempts to recognize its position at so great a distance from the surface are sure to be attended with extreme danger of causing further damage. Exploration for the detection of a bullet should be made by gently passing a blunt probe along the track to whatever depth the surgeon may consider justifiable, but it should be confined strictly to the line of the channel in the brain, no lateral motion being given to it." Gentle exploration can be made with Fluhrer's aluminum probe, the patient being placed in such a position that the light probe will follow the track of the bullet purely by the influence of gravity. If the bullet is found it should be extracted with forceps. If the bullet has traversed the brain and lodged on the opposite side, the point of lodgement should be accurately determined, trephining should be performed over the estimated spot, and the bullet extracted. If the bullet is not found, even after the second trephining, I do not believe it is wise to persevere in the search. Fluhrer, however, uses the second opening as a door for exploration, believing that the bullet has been deflected and has probably passed toward the base.

---

[1] Traumatic Injuries of the Brain.

In modern military surgery lodged bullets in the brain will be comparatively rare, because the small, hard-jacketed, rapidly-advancing and quickly revolving projectile of a small-bore rifle is far more apt to perforate than to lodge.

Even if a bullet cannot be removed, I believe trephining is advisable in order to asepticize, arrest hemorrhage, prevent compression, and provide for drainage. It is certain that recovery may follow even when the bullet is not removed. Robert Fenner[1] has recently reported an interesting case. A man, aged forty-two years, was accidentally shot when at a distance of two yards from the revolver. When seen one-half hour later he was unconscious, his respirations were heavy but not stertorous, his pupils were dilated and did not respond to light, and blood was oozing from the mouth and nose. The wound was at the back of the head, about one and one-half inches to the right of the middle line and "two inches above a line touching the upper margin of the external auditory meatus." The wound was bleeding and brain matter protruded. The wound was irrigated and trephining was performed, and bone fragments were removed. The bullet could not be felt with the finger or a probe. The wound was irrigated with corrosive sublimate (1 : 4000). Personally, I would hesitate to thus employ a mercurial solution. It is a powerful irritant, which, if applied to the brain, would do more harm than good. A drainage-tube was introduced. The next day consciousness was regained, but the patient was irritable and could be aroused with difficulty. The following day the patient remained irritable, oozing continued from the nose and mouth, and both eyes were ecchymosed. Much brain substance came out on the dressings. Eight days after the accident the patient became entirely rational. His temperature remained at 100° or over for eleven days after the accident, and bleeding from the nose ceased eighteen days after the accident. A hernia cerebri formed, but got well. The patient left the hospital a little over five weeks from the time of the accident, with the wound healed, without any paralysis, with no impairment of smell or taste, but in an irritable and "childish" mental condition. One year later he had an ataxic gait and hemianopsia. Had it been possible to extract this bullet these late results might have been avoided. This case shows what extensive damage may be consistent with life, but also proves, as Phelps states, that a retained projectile will cause trouble. In this case hemianopsia and ataxia developed after the patient left the hospital; hence they were not due to the passage of the bullet, but resulted from its lodgement. In this case there must have been an extensive fracture of the anterior fossa of the base of the skull, and in such cases the nostrils, mouth, and pharynx should be frequently irrigated with boric acid solution or salt solution and occasionally insufflated with iodoform, and the nostrils should be kept plugged with iodoform gauze in the intervals between irrigations.

---

[1] Lancet, February 11, 1899.

A case of gunshot wound of the head, reported by G. Lacy Barritt,[1] shows what extensive injury may occasionally be inflicted on the brain without causing death. A boy, aged fifteen years, was out shooting. He was missed at lunch, and search being made he was found lying upon the ground rubbing his head. His coat and shirt were bloody, and he seemed to be dazed, though he got up when told to, picked up his gun, and walked two hundred yards to the house. He would not speak. It was noticed that blood was flowing from a wound in his forehead and that he had difficulty in using his right hand. A bandage was applied by a farm hand, and the boy was driven three miles to a hospital. In a short time he was seen by Barritt, who found him semi-comatose. On the forehead, three-quarters of an inch above the centre of the left eyebrow, was a punctured wound the size of a sixpence. Over the centre of the left parietal eminence was a larger wound. These wounds led through the skull-cap. The bone was not splintered, and the punctures were almost as clear cut as if made with a drill. A fine probe was introduced for two inches from each opening. Further inquiry and a subsequent statement from the boy after he recovered showed that while loading his gun, a cap being on the nipple and the hammer being at full cock, he was ramming with an iron ramrod, when the gun went off and the iron ramrod was driven through his head. The ramrod was found fourteen yards from the spot where he fell, "with his cap transfixed on it."

His temperature was normal. His pulse was slow but regular. He could be roused to answer questions. "He could move all his limbs, but it was noticed that the movements of the right arm were clumsy and awkward." The right pupil was normal; the left pupil was dilated; both pupils reacted to light, the left more slowly than the right. The wounds were dressed antiseptically, and an ice-bag was applied to the head. On redressing the wounds at night some brain substance was found on the dressings, the paralysis of the right arm was more evident, and the left pupil was more dilated. For four days his condition was practically unchanged except in the evenings, when the temperature rose to 100° F. On the fifth day the patient was more conscious and the arm was stronger. From this time the improvement was progressive, and the patient was allowed to get up three weeks after the accident. He entirely recovered the use of his arm. Barritt says:

---

[1] Lancet, January 7, 1899.

"The above case, I take it, clearly shows that the brain can sustain injuries which one would consider to be absolutely fatal, and yet will recover without any appreciable detriment to its structure, although the parts injured were in the left frontal lobe of the brain, where some loss of function might be considered almost certain. No doubt the ramrod passed at a terrific velocity through the skull and brain structure; being made entirely of iron and of considerable weight, it would cause less destruction of tissue than if the ramrod, as is usual, had been made of wood, as the velocity would have been less, the weight of the iron ramrod adding explosive power to the powder. My friend Mr. Sydney Jones, of St. Thomas' Hospital, saw this case about six weeks after the accident, and pointed out the peculiarly shallow shape of the boy's skull over the frontal eminences. This, I think, makes the case still more extraordinary, as had the ramrod passed entirely through gray matter one would think it must have destroyed some important centre. I think the ramrod penetrated the gray matter at the orifice of entrance and again at that of exit, the seat of the track being through the white substance. The wound must have been very near the centre for speech and also that for the movements of the arm. The speech was never impaired, the wound no doubt being above and internal to the centre; the centre for arm movement was also not touched or it must have been destroyed, the partial paralysis, I presume, being due to pressure from hemorrhage through the wounded track of brain, which must have been very near it. As the hemorrhage abated the paralysis disappeared."[1]

Barritt's remarkable case reminds us of the celebrated "American crow-bar case," as it was called by certain foreigners skeptical as to the truth of the report. A crow-bar was driven completely through a man's head by the premature explosion of a blast. The bar was over three feet long, and weighed about thirteen pounds. After receiving the injury the man walked a considerable distance. He was treated by the application of wet cloths and recovered. He lived for a number of years, showing no evidence of injury except some alteration in character. The report on this case was clear and positive, and Barritt's case strongly resembles it.

---

[1] Lancet, January 7, 1899.

Craniotomy for Microcephalus. I see no occasion to qualify the opinion expressed in Progressive Medicine last year, that the surgical treatment of idiocy is futile. Bourneville, Senn, Marchand, Tillmanns and many others consider craniotomy usually an unjustifiable operation. As Tillmanns puts it,[1] in speaking of microcephalus: "We almost always have to deal with a congenital malformation of the brain which is not influenced by the formation of defects in the skull. The growth of the brain in microcephalus is not prevented by the cranial bones or synostosis of the cranial sutures, but the brain remains too small because there is too little brain matter present. It is only in exceptional cases of microcephalus with premature closure of the cranial sutures and fontanelles that craniotomy finds its justification."

L. McLane Tiffany[2] says that in conditions of defective intellect the value of operation is very uncertain. "Probably the most sensible way to look at it is to consider that imbecility is a symptom, and then to discuss the question as to whether trephining will relieve it by removing the cause. It is perfectly plain that when an undeveloped brain is present trephining will be useless. When there is arrested development no good is to be expected." Tiffany goes on to say that if the cause of mental defect is removable (tumors or clots) it is possible that the removal of the cause may improve the mental condition, but no good will follow operation when there are changes in the brain tissue—for instance, when there is excess of connective tissue (porencephalus). "Of late years, and in a large number of cases, the scalp has been reflected and the head has been opened very extensively for the purpose of permitting an increase of growth and development of the brain. There are supposed to be cases in which the brain is unduly small. A favorable result has been reported a number of times shortly after operation, as though the operation had acted as a stimulant to the development of the brain. Probably it would be just as well if we knew the result after a year or two, then we might form an idea as to whether improvement reported immediately after operation had continued, and whether the improvement was not temporary, or whether a relapse to the original mental condition did not take place. The dura in such cases has never been opened to an extent equalling the cranial cut, and the amount of enlargement which was given to the intracranial space was probably not very great. At all events, before we decide on the expediency of such an operation some light on the subject is wanted."[1]

---

[1] Tillmanns' Text-book of Surgery, translated by Tilton.

[2] International Text-book of Surgery, edited by J. Collins Warren and A. Pearce Gould.

Speaking of linear craniotomy for microcephalic idiocy, Rose and Carless[2] say: "Temporary improvement has followed in many cases, but the final result has now been shown to be extremely uncertain, the majority of the patients relapsing, owing to the contraction of the dense cicatricial material which replaces the bone. The proceeding cannot be looked upon as more than a justifiable experiment."

The great defect in most of the favorable reports is that they have been made too soon after operation. As Tillmanns says, considerable time must elapse before it is possible to say that permanent improvement has been secured. Temporary improvement is very common, and for obvious reasons. The idiot is placed under positive and careful control. The child is watched, regulated, and directed. The new faces, the strange voices, the unaccustomed surroundings, the peremptory control, the administration of the anæsthetic, the shock of the operation may produce a powerful temporary effect. As a result the patient may for a time become quieter and more tractable, but this improvement does not last. Occasionally an idiot has a maniacal outbreak and becomes particularly difficult to control, and as a result the family determine to have an operation performed. After an operation the child may rise to its old level of idiocy, and this is often mistaken for an improvement, or rise above the old level. A report of cases which have been operated upon some years ago is urgently needed, and no more cases should be attacked until such reports are published. Dr. Barr, of the Pennsylvania Institution for Feeble-minded Children, called the author's attention to two cases under his charge which had been operated upon outside of the hospital, and are now worse than before the operation. E. Blanc[3] reports some later details of seven cases in which linear craniotomy was performed for microcephalus with idiocy. Two of the cases were operated on seven years ago, one case was operated on five years ago, and four cases several years ago. In each of these cases marked improvement had been noticed soon after the operation, but the improvement was only temporary, and every case returned to the mental level which had existed before the surgeon interfered. Every inch of ground gained was soon lost. Blanc maintains that the permanence of the result depends on the nature of the idiocy. The most common form of microcephaly is the primitive, the development of the brain having been arrested in the fourth month of gestation. In such a case the operation cannot be productive of permanent improvement. In the very rare cases of late microcephaly (post-embryonic microcephalus) Blanc thinks the results may be better. I have assisted in a number of operations for idiocy, but have never been persuaded that any real or lasting improvement followed surgical treatment. I have never performed the operation myself, and never expect to.

---

[1] Tiffany, in International Text-book of Surgery.

[2] A Manual of Surgery.

[3] Loire Médicale, December 15, 1898.

Post-operative Insanity. Mental disturbance may follow operation, but, as Picqué says,[1] this statement is not always the same thing as saying that the disturbance is of necessity due to the operation. Picqué thinks that often such disturbances are not due to the operation. The patients may have labored under some condition or some disease which is the real cause of the mental condition (kidney disease or chronic alcoholism). Delirium may arise as a result of infection or of iodoform-poisoning. Picqué rules out of consideration such conditions, calling them pseudo-deliriums, and limits the term post-operative insanity, or post-operative psychosis, to mental disturbances which arise because of the operation.[2] Mental disturbance is unusual after operations. It is found after ½ of 1 per cent. of all operations.[3] It has been claimed that gynecological operations are more apt to be followed by mental disturbance than are other operations. Removal of the ovaries and tubes is thought by some to be especially dangerous, and trivial plastic operations have been regarded as more strongly predisposing than larger operations. Clarke[4] thinks that insanity is particularly apt to follow operations on the female genital organs. Potherot says these patients are most commonly seen in gynecological practice. Howard Kelly, Rayneau, Monteyl, Picqué, Richelot, Segond, Hartmann and others deny that gynecological operations have a specially evil tendency.

Probably the truth of the matter is that women are more liable to insanity than men ; that many women who are neurasthenic and of unstable mental organization labor under disorders of the reproductive organs, and are operated upon more frequently than are men in a like nervous condition ; that many women have such fear of an operation that they become really panic-stricken when an operation is determined upon. Such facts would go far to explain the greater frequency of the condition in women than in men. Nevertheless, there is evidence that when the menopause is suddenly brought about in a young woman a violent mental strain is apt to ensue which may overthrow the mind. The menopause, even when it comes on gradually and naturally, is accompanied by modifications and disturbances of the intellect, the emotions, and the moral nature, modifications and disturbances which may reach a pathological degree. It is a critical and dangerous period. If these perturbations and modifications are induced suddenly the condition will be much more critical and dangerous. Some have thought that insanity after oöphorectomy may be due to absence of the internal secretion of the ovaries. Clarke[1] denies this, and says in such conditions the administration of ovarian extract rarely does any good. One fact is to be always borne in mind: that is the statement of Picqué that every post-operative delirium is not post-operative insanity. Without remembering this the causation of the condition will be involved in hopeless confusion. Many elements have been set forth as causes: fear of operation, the anæsthetic, shock, auto-intoxication, sepsis, absorption of carbolic acid or iodoform, ill-health, the alcohol or opium habit, homesickness, and hysteria. Picqué says the condition is most common in hysterical women, old men, and children. Tuffier says it is very rare in children.

---

[1] Centralblatt für Chirurgie, January 7, 1899.

[2] Ibid.

[3] Rayneau, Journal de Neurologie, August, 1898.

[4] Albany Medical Annals, January, 1899.

We should always try to make a distinction between a drug delirium, sepsis, hysteria, and a true insanity. Most reported cases are deliriums; very few are true psychoses. The true psychosis usually arises suddenly within the first week after operation. It commonly begins with maniacal excitement, unsystematized delusions, mental confusion, and incoherence of speech. As a rule the patients recover, but in some cases the mania gives place to melancholia or dementia or even paranoia. If dementia arises or paranoia develops recovery will not take place. In the true post-operative insanity there is insane predisposition, hereditary or acquired, and the physical and mental effect of the operation is the exciting cause. The emotions conjured up by anticipating an operation (fear, apprehension, etc.), the exhaustion produced by the operation, and the morbid dwelling on what has been done, act upon a predisposed brain as would an accident, a financial loss, or a business failure. Picqué says that chronic cases have hereditary tendency to mental disease. Rayneau says the evidence points to the fact that post-operative insanity occurs in those in whom there is hereditary or acquired predisposition. Regnier says no operation actually "gives birth" to insanity. It develops but does not create certain latent tendencies.[2] Monteyl[3] says a medicinal or septic delirium may follow an operation on any patient, but lunacy arises only in the predisposed.

The lesson is that when a surgeon is forming a conclusion as to the advisability of performing an operation he should take into account the mental condition of the patient, especially the mental history, the tendencies, and the predispositions—hereditary and acquired. In a person strongly predisposed to insanity only an operation of necessity is justifiable.

---

[1] Albany Medical Annals, January, 1899.

[2] Medicine, September, 1898.

[3] Revue de Chirurgie, May 10, 1899.

A neurasthenic woman is apt to morbidly magnify some trivial symptom and desire earnestly to be operated upon. A surgeon must conduct a careful investigation to determine the real value of the symptoms, and must not be in haste to operate on such a case. An operation on such a case is rarely productive of permanent benefit, and is occasionally followed by disastrous consequences. If a neurasthenic patient has a movable kidney, anchoring the kidney will not cure the neurasthenia.

Hysterical excitement after an operation is by no means uncommon. James E. Moore has pointed out that after a surgical operation there may be a hysterical rise of temperature, a persistent hysterical hiccough, cough, or emesis.

Surgical Operations for Insanity. From time to time some surgeon recommends the performance of operations upon insane patients for the double purpose of amending a local disease and improving the mental state. It has been maintained that gynecological operations particularly are apt to be followed by mental improvement. We have previously referred to the belief that gynecological operations more commonly than other surgical procedures excite insanity in those who possess a morbid predisposition. The belief that gynecological operations may also cure insanity seems to be one with the belief that like cures like, and that the proper treatment for a diseased condition is "a hair of the dog that bit you."

A. T. Hobbs believes that mental improvement is apt to follow an operation, especially a gynecological operation.[1] Hobbs' report sets forth the results of 196 operations on 110 women. He performed ovariotomy twelve times. Seven cases recovered mentally, four improved distinctly, and one died from pneumonia. Seventeen hysterectomies were performed. Five recovered mentally, three improved, seven did not improve, and two died. In twenty-two cases a displaced uterus was restored to position and fixed by ventral fixation or shortening of the round ligaments. Four of these cases recovered mentally, but eleven improved. In thirty cases the cervix was amputated. Twelve recovered mentally and nine improved. In twenty-one cases a trivial operation—for instance, curetting—was performed. Twelve recovered mentally and two improved. In eight cases operation was performed for vaginal disease, fistula, etc. In no case did mental recovery follow, and in only three cases was there improvement. Hobbs concludes that 36 per cent. of the 110 cases were cured mentally, 29 per cent. were improved, and 3 per cent. died. Such figures seem convincing, but require analysis. Because recovery follows the operation is not proof that it is due to the operation. The majority of cases of acute insanity recover. It is estimated that over 70 per cent. of acute manias and over 50 per cent. of melancholiacs recover from a first attack. To persuade us that operation has a positive curative effect on such cases, it is necessary to show that the recovery-rate is markedly better after it than without it. Again, while most acute cases get well the same cannot be said of prolonged cases. In the first six months of an acute case the chance of cure is good. In the second six months it is only half as good. After the third year it is almost *nil* (Régis). The question is, Does operation notably improve the recovery-rate in such cases? If treated by ordinary methods secondary dementia and paranoia are never cured. Does operation ever cure these conditions?

---

[1] American Journal of Surgery and Gynecology, 1898, xl., 1–3.

It is not disputed that operation may at times be followed by cure, but the wisdom of following such a course as a plan of treatment is disputed. It is justifiable to operate for bodily ailments if they produce discomfort, or distress, or endanger life, but it does not seem proper to operate on a condition which is not dangerous and not distressing, in the faint hope that it may improve the mental condition.

Operation may be followed by cure just as a mental shock, a carbuncle, an attack of erysipelas, a crop of boils, or a fall may be followed by cure. In a case of acute mania, in the Insane Department of the Philadelphia Hospital, cure followed a fall from a considerable height, and in another case in the same institution cure took place after a patient had forced a ring over his penis into such a position that the parts were much lacerated in accomplishing removal. Clouston saw a man cured of hypochondriacal melancholia by losing his fortune and being obliged to go to work to make a living. The same observer saw a woman cured of melancholia by marrying a widower with seven children, and a mother cured of melancholia by losing a child. Such events may produce physical or mental shock, and thus possibly interrupt morbid mental habit, and, so to speak, raise the thoughts out of a groove and concentrate the attention on new and real subjects. The older alienists were fond of using the seton in the back of the neck in order to induce suppuration and fever, and in some cases improvement followed. An aseptic wound seems less likely to be followed by improvement than a septic area accompanied by fever. When a case seems tending toward dementia a powerful physical or mental impression may retard it.

That delusions point to any particular part is not proof that there is a diseased condition of the part which is influencing the mental condition. Some few delusions have a visceral basis, and of these cases

Clouston says but 20 per cent. recover. The fact that a delusion of melancholia has a visceral basis is no proof that the insanity has the same basis. A delusion is the result and not the cause of the insanity, and insanity often exists without any delusions. A visceral lesion may influence the direction the delusions take, but it does not cause those minute structural changes and those perversions of the subtle chemistry of the nerve-cells which are made clinically manifest by the symptom known as insanity. It is worth remembering that cures produced by shock are apt to be sudden, and a sudden cure is not so apt to be lasting as is a more gradual one. Again, it is to be remembered that shock may make the condition worse. Some reported cures by surgical operation would doubtless have been cured without it, and the more gradual cure might have been better for the patient than the rapid cure, and less apt to be followed by relapse. Ernest Hall[1] has reported a somewhat unusual case of surgical operation for insanity. The patient was a married woman, aged fifty-two years, with a strong family history of insanity. She had never been pregnant, and had been healthy until her thirty-eighth year, when she was attacked with "ovaritis" of the right side, which confined her to bed for six weeks. Since that period she has had pain in the right side and sluggish bowels. Eight years ago she had an attack of melancholia, lasting several months. About three years ago she again became melancholic, and was sent to an asylum. Two years later Dr. Hall made a pelvic examination, and found a retroverted uterus bound down by dense adhesions. An operation was advised. The clitoris was loosened from adhesions. The uterus was dilated and curetted, and on opening the abdomen the omentum was found to be adherent to the parietes over a considerable area. The pelvis was a "mass of adhesions," and with great difficulty the uterus was freed from the sacrum and bowels. The right ovary could not be found in the adhesions. The left ovary and tube were found and removed. Ventrofixation of the uterus was performed, and the abdomen was closed. The reporter tells us that this patient showed noticeable improvement on awakening from the anæsthetic. He tells us that nine months later the woman had gained thirty-five pounds, and that since the third week after operation "she has exhibited no indications of mental abnormality." This patient was apparently cured by the operation, rapid recovery from a second attack of melancholia taking place after removing the tube and ovary, straightening and fastening the womb and separating adhesions. An extraordinary fact is the long duration of the attack, because recovery is rare after one year, but does, of course, occasionally occur. That the recovery will prove permanent is very doubtful in view of the family history and of the fact that she has already had two attacks of insanity.

---

[1] Pacific Medical Journal, February, 1899.

Surgical Treatment of Epilepsy. Some years ago it was believed, and more recently it was hoped, that many operations for epilepsy produced cure. Recently the profession has lost confidence in these operations. Any operation may for a time interrupt the epileptic habit, but no operation seems definitely capable of permanently curing the disease. After a cerebral operation the case is often apparently cured for a time, but as adhesions between the dura and brain form an area of irritation is established and the fits begin again. Bourneville has shown that in epileptic patients re-ossification of the trephine openings is apt to occur.[1] Kocher[2] says the view was formerly held that 60 to 70 per cent. of those operated upon recovered, but the recent statistics of Graf and Braun show that but 2 to 4 per cent. remain well over three years. The high percentage of cure which was formerly claimed arose from confidence in case-reports which were published too soon after operations. Bourneville[3] says that a report of cases operated upon should be made a year or more after operation. When this is done our confidence in the operation wanes. Bourneville traced six epileptics who had been operated upon from four to ten years ago. In not a single case was the condition any better than before the operation. In spite of such discouraging reports Schär is sufficiently hopeful to advise that an operation be performed in epilepsy if ordinary medicinal and dietetic treatment fails. Braun, in the report referred to by Kocher, records a case of Jacksonian epilepsy treated by excision of the hand-centre. This patient was still well seven years after operation, and must be regarded as cured. Braun collected fourteen cases in which the motor-centre was removed. Four were not improved, five were much improved, five were reported cured. Only one of the five cures had been under observation more than fourteen months. Most epileptics are strongly predisposed to the disease by hereditary morbid tendencies, and no operation can cure them. Von Bergmann[4] points out the above fact, and says that "spasmophilous alterations" take place in the brain, and the condition is hereditary in nine-tenths of all cases. When these alterations exist, Von Bergmann considers an operation useless.

The fact that trephine openings may fill up with ossified material shows that the dura may produce bone (Chipault). Chipault and Berezowsky[5] maintain that to prevent osseous formation a portion of the dura should be removed with the bone. Tuffier[1] everts a portion of the dura and sutures it to the pericranium. Kocher[2] inquires if there is some improvement possible in the operation for epilepsy, and after such improvement will the results be better? Hughlings Jackson pointed out an improvement applicable to some cases—that is, the removal of a portion of the cortex. Von Bergmann has done this in twenty cases, and claims that three of them were cured. Kocher maintains that operation succeeds if a cause for the epilepsy is found and removed (removal of fragments of bone pressing on the dura, loosening of adhesions, evacuation of abscesses). He claims that 70 per cent. of such cases are apparently cured. If the dura has been lacerated by bone fragments, he thinks the chance of cure is better than if it has not been lacerated. If the dura is injured, according to the figures of Schär and Kocher, 85 per cent. of the patients are apparently cured by operation. We know, as a matter of fact, that epilepsy is more common after a slight injury of the skull than after a severe injury. In cases in which the cause cannot be reached and removed the results are vastly better, according to Kocher, if at the time of operation the dura is opened. He says that if the dura is not opened 14 per cent. are cured; if it is opened, 54 per cent. are cured. It is well to remind the reader that Kocher's cures are estimated from the time the case was reported, and many of them were reported soon after operation. Kocher asserts that epilepsy is due to a local or general increase in intracranial pressure, and he is persuaded that opening the dura has a curative influence. In fact, he thinks it possible that in the cures attributed to excision of the cortex the improvement was really produced by opening the dura. The opening made in the dura acts as a valve and lessens elevated pressure. Six cases operated upon in this manner have been well over three years, and in these cases the trephine opening is soft and yields to blood pressure. In cases which have recurred after operation the trephine opening is found hard. In the cured cases a veritable safety-valve seems to exist. Kocher claims that severe injuries of the skull are apt to form such safety-valves, hence epilepsy rarely follows; slight injuries are not apt to form safety-valves, hence epilepsy is more common after them. Kocher points out that if the dura is not opened the defect in the skull is eventually closed with bone; that if it is opened new bone is not formed. Kocher believes that increased pressure is the actual cause of epilepsy. Epilepsy can be produced in a guinea-pig by striking the head repeated light blows with a hammer and thus raising the cerebral pressure. If the dura is opened before the blows are struck epilepsy cannot be so produced. In many of Kocher's cases of traumatic epilepsy there was cyst-formation, and cyst-formation increases pressure. In order to regulate pressure locally, trephine, enlarge the opening with rongeur forceps, open the dura by crucial incisions and cut off the apices of the triangular flaps. When it is necessary to regulate the general intracerebral pressure two methods are open to us. For a cyst or fluid collection in the ventricles the surgeon may insert a silver tube for drainage, and drain, it may be, for some time. In one case Kocher drained a cyst for three years, and the patient was finally cured. The same end may be achieved by removing much bone and a considerable portion of dura. Kocher[1] says multiple valves may be made, the bone being drilled at many points and fine tubes being used for drainage.

---

[1] Ninth Congress of Alienists and Neurologists.

[2] Deutsche medicinische Wochenschrift, April 13, 1899.

[3] Ninth Congress of Alienists and Neurologists.

[4] Deutsche medicinische Wochenschrift, April 13, 1899.

[5] Journal of American Medical Association, May 13, 1899.

---

[1] Société de Chirurgie, April 12, 1899.

[2] Archiv für klinische Chirurgie, 1899.

Kocher's report is distinctly hopeful, and will lead undoubtedly to renewed activity in operating on these cases. Epilepsy is such a terrible and hopeless disease that every new suggestion regarding treatment should be carefully considered, and any plan which seems promising should not be rejected without thorough trial. Kocher's view, that convulsions may be produced by increased pressure of the cerebro-spinal fluid, is strengthened by the observations of Stadelmann, who performed lumbar puncture during epileptic seizures and found that the cerebro-spinal pressure was elevated. Nawratz and Arndt[2] found by lumbar punctures that before the beginning of an epileptic attack the cerebro-spinal pressure is normal; during the tonic stage it is greatly increased; during the clonic stage it changes, being now high and now low, and at the end of the attack it becomes normal. The experiments of Nawratz and Arndt indicate that the increased pressure results from and does not cause the attack. The fixation of the respiratory muscles, by interfering with the return of venous blood to the heart, causes stagnation of venous blood and elevated intracerebral pressure. This condition is aggravated by the pressure on the vessels produced by contraction of the neck muscles.[3]

In this connection it is well to use the words of an editorial in the *Journal of the American Medical Association*, September 16, 1899:

"The epileptic attack has been attributed to various and even opposite influences, thus to both cerebral anæmia and cerebral hyperæmia, local or general, to both increase and diminution in intracranial pressure, to accumulation and discharge of nervous energy; but no one explanation is entirely sufficient or satisfactory for all cases. Sometimes the one, sometimes the other influence appears to be effective or at least provocative."

---

[1] German Congress of Surgery, April, 1899. Deutsche medicinische Wochenschrift, April 13, 1899.

[2] Berliner klinische Wochenschrift, 1899, p. 662.

[3] Journal of American Medical Association, September 16, 1899.

DIVISION OF THE SYMPATHETIC NERVES AND RESECTION OF THE SYMPATHETIC GANGLIA. In 1882, Alexander tied the vertebral artery in an epileptic in order to influence the cerebral circulation. He operated upon twenty-four cases. In some of the cases he tied one vertebral artery, in others he tied both vessels. He claimed to have obtained six cures in the twenty-four cases. In spite of the apparently favorable results the operation has not proved of value and has been practically abandoned. The striking pallor at the beginning of an epileptic attack might be attributed to stimulation of the sympathetic. Jonnesco suggested that stimulation of the sympathetic might be the cause of the attack, and division of the cervical sympathetic on both sides might prove useful. Later (1897) he recommended and performed bilateral resection of the superior cervical ganglia. In his more recent cases he has performed bilateral resection of the three ganglia and the connecting nerves between them. Jonnesco[1] performed this operation on 45 epileptics. In 42 of the cases complete bilateral resection was carried out; 6 patients died; 19 have been observed for a considerable time. Jonnesco reports 10 of these cases as cured; 5 of the cured cases have been well for about two years; 6 of the 19 cases are reported as improved and 2 as not improved. That five cases should be apparently well after two years is of interest. Jonnesco's patients, according to Donatti, were observed for only a short time. The death of six patients out of forty-five, soon after operation, should be noted. Chipault operated 71 times and collected 40 cases from literature, and in this series there was not a death due to operation. Donatti[2] believes the operation to be useless because the results of section of the sympathetic, though positive at first, pass away in a few days. In one of Donatti's patients the right side was operated upon. The right side of the face became warm and red, perspiration was increased, the conjunctiva was reddened, and the pupil contracted. Within four days all of these results disappeared. This patient died before the left side could be subjected to operation.

Jaboulay and Lannois[3] carefully consider the value of Jonnesco's operation. They tell us that recorded cases indicate that some few patients are cured, a number are improved, and many are not benefited by the operation. Their own results point to the same conclusion. In their cases, in the ones which were improved and in the single case which was cured, there was a powerful element of hysteria. Jaboulay and Lannois condemn the operation as useless.

Jaboulay and Lannois[4] report a case of epilepsy, due to fright, in a boy of eighteen years of age. He had as many as eight attacks a day. The cervical sympathetic ganglia were removed from one side, and the pneumogastric was stretched on the other side with the idea of lessening the excitability of the brain. This patient was apparently cured. Carl Beck,[1] of Chicago, thinks that the operation is devoid of usefulness, the reported changes for the better being accidental, or only such changes as may be observed to follow any operation whatever. Laborde[2] produced epilepsy in guinea-pigs by partial division of the medulla. He found that removal of the sympathetic nerve and its ganglia did not cure or even improve the condition; in fact, it made the epilepsy worse. If the sympathetic ganglia are first removed the epileptic condition can be produced just as readily as before.

---

[1] Centralblatt für Chirurgie, 1899, No. 6.

[2] Wiener klinische Wochenschrift, 1898, No. 16.

[3] Revue de Médecine, January 10, 1899.

[4] Ibid.

I see no reason to alter the view expressed last year, that the operation is not a cure for epilepsy. Cures have followed its performance, as they have followed all sorts of operations as a result of the operation *per se*. In many of the reported cures there was a strong element of hysteria. Most of the alleged cures and improvements have been reported too soon to serve as a basis for sound deductions. No clinical observations prove that the operation is useful, and many observations indicate that it is useless. Laboratory investigations suggest that it cannot possibly do good.

Tuberculous Meningitis. Can tuberculous meningitis be due to traumatism? This question has recently arisen. Waibel[3] reports an important case. A cheerful and apparently healthy schoolgirl received a blow on the head. The left eye became injected and the lid swelled. The child complained of headache, but continued to attend school. She was in low spirits and often wept. On the evening of the third day after she was struck she vomited several times and took to her bed. Nine days after the injury she was depressed, moaned often, complained of pain in the forehead, was weak and constipated. The eyes were extraordinarily bright and the facial expression was dull and heavy. The temperature was 38.5° C. The lungs and spleen were normal. The next day the mind became obscured; the child moaned and shrieked, and obviously had violent pain in the head. The pupils were normal. She went from bad to worse, and died twenty-six days after the injury. The autopsy showed the lesions of recent basilar meningitis. The lungs contained tubercles and the bronchial glands contained caseating tubercle. Waibel maintains that the primary focus was in the bronchial glands, that the meningitis arose secondarily, and that the exciting cause was the trauma which by disturbance of the chest caused bacilli to pass into bloodvessels and lymph-vessels, and by disturbance of the brain established a point of least resistance in which micro-organisms lodged and multiplied. The first symptoms pointing to severe brain disease occurred on the tenth day, and Waibel reminds us of the views of Koch and Baumgarten, that tubercles require ten or twelve days to attain their growth. Waibel and others testified before the District Court of Munich that in their opinion the disease was due to trauma, but positive proof did not exist, because pathological examination cannot distinguish between a tuberculous meningitis due to trauma and one arising when there has been no trauma.

---

[1] Chicago Medical Recorder, April, 1899.

[2] Gazette Hebdomadaire des Sciences Médicale, January 8, 1899.

[3] Münchener medicinische Wochenschrift, 1899, No. 5.

Mastoid Suppuration and Abscess of the Brain. Pierre Delbet,[1] in speaking of an individual brought into a hospital in an unconscious or semi-comatose state, tells us to try and obtain an accurate history from friends or relatives, and then to remember the possibility of an auricular origin, and examine the ear.

If the coma is due to a condition induced by ear disease we often, but not always, find pus running from the ear. In some cases purulent flow from the ear ceases when the mastoid cells become inflamed, the swollen mucous membrane blocking the auditus. Hence, as Delbet says, a dry ear does not prove that the coma is not of auditory origin, and when the ear is dry an otoscopical examination should be made to find out if there is a reddened or perforated tympanum. In mastoid suppuration there are usually bulging of the posterior and upper wall of the external auditory meatus and œdema of the skin back of the ear; but in the earliest stages these signs are absent, and they may be absent even in a well-advanced case. There is one sign which can always be detected, and that is tenderness over the mastoid process. This is manifest even when the patient is comatose, and, as Schwartz points out, pressure on the mastoid may temporarily arouse a patient from stupor or coma.

TREATMENT. Joseph Collins wrote for the *American Journal of the Medical Sciences*, April, 1899, "A Critical Summary of Recent Literature on the Treatment of Abscess of the Brain." He says there is but one mode of treatment—"prompt surgical interference"—and when this is practised there is "a far greater prospect of cure than in any other intracranial lesion." Collins says it is generally recognized that medical treatment is absolutely useless and surgical intervention is imperatively demanded, and yet literary records show that the rate of mortality has not lessened as it should have done. He attributes this: First, to failure to recognize the disease early; and, second, to the fact that "the surgeons are oftentimes not sufficiently assiduous in their search for it." Collins concludes with the following words:

---

[1] Leçons de Clinique Chirurgicale.

"Thus it will be seen that a brief retrospect of the more important literature on brain abscess for the past year shows a deplorable mortality. The most potent factor in contributing to this frightful mortality is the failure to recognize the existence of abscess of the brain before it has produced either septic complications or profound exhaustion. Surgical technique has apparently very little, if anything, to do with it. The mortality-rate of brain abscess will drop just in proportion to the earliness of recognition and the courage of the physician in directing the surgeon to seek for it, even though there be no exact localizing symptoms.

"Abscess of the brain secondary to middle-ear disease is located in the vast majority of cases either in the temporal lobe or in the cerebellar hemisphere of the same side. When one is reasonably sure of the existence of brain abscess no hesitation should be had in exploring first one of these regions, and then, if it is not found, the other. Delaying the operation until the appearance of unequivocal localizing symptoms, or procrastinating by operating on the mastoid after symptoms of brain abscess are evident, when one is reasonably assured that abscess exists, is a far greater injustice to the patient than subjecting him to an exploratory trephining."

Infective Sinus Thrombosis. In this disease the only hope is operation—the earlier the better. Bacon[1] reports three cases of thrombosis of the sigmoid sinus, the condition in each case being of otitic origin. He operated early by opening the sinus and removing the clot, and all the patients recovered. Bacon offers the following important suggestion: Always examine the pus coming from the ear in suppurative otitis media. If it contains pneumococci and streptococci we are sure that the inflammation arose simultaneously in the attic and middle ear, and in order to obtain good drainage it is necessary to make a large incision in the drum.

That the surgeon so often comes upon the scene late in these cases is an unfortunate fact. A few months ago a boy was sent to the Jefferson Medical College Hospital in a semi-comatose condition. He had suffered for years from a running ear. One week before admission the discharge had become scanty, and he developed headache and vomiting. A doctor who was called in gave a fever mixture and applied a poultice to the ear. (I would say, in passing, that Bacon[2] has wisely condemned the administration of antipyretics in any doubtful case, because it obscures the diagnosis.) The child became worse and finally, after six days, another physician was called in, who recognized the condition and sent the child to the Jefferson Medical College Hospital. The temperature was irregular, rising and falling in a few hours, the periods of fall being marked by sweats. There was retroauricular redness and œdema. The child was semi-comatose, moaned frequently, and pressure on the mastoid caused evidences of violent pain. Dr. George W. Spencer and I operated. We opened the mastoid and evacuated an abscess. On exploring the lateral sinus it was evident that it contained a clot. The sinus was opened and there was no bleeding. The clot was scraped out from the upper end until blood flowed, when the upper end was occluded by pressure with iodoform gauze. The clot in the lower end was purulent and disintegrating. The jugular vein was exposed in the neck and a clot was found high up in it. The vein was tied in two places and divided between the ligatures. The puriform clot in the lower end of the sinus was scraped away and packing was inserted. This patient was desperately ill for days, presenting the symptoms of pyæmia. Ulcerative endocarditis developed and the patient was placed upon antistreptococcic serum and at once improved. Complete recovery finally ensued. The improvement when serum was given was notable and rapid, and the cure began at this time. I was much surprised at this, having had no belief in the value of the material. Since then, in a case in which endocarditis followed streptococcus infection of an amputation stump, amputation having been performed because of mangling with shot, the same notable and rapid improvement occurred. In view of these two cases it seems fair to claim that a thorough trial should be made of antistreptococcic serum as an aid to the surgeon, though not as a substitute for surgery.

---

[1] New York Medical Journal, July 1, 1899.

[2] Ibid.

Milligan reviews Otology,[1] and thus sets forth Whiting's views as to operation :

"1. The indications which justify an operator in ligating the jugular before exposing the sinus should be very decided and as follows : (*a*) The existence of chronic otorrhœa ; (*b*) pronounced manifestations of pyosepticæmia, high fever, sudden remissions, and repeated rigors ; (*c*) metastases ; (*d*) Griesinger's symptom—occipital œdema ; (*e*) œdema of the eyelids of corresponding side ; (*f*) tenderness along the course of the jugular in the neck, and perhaps the cord-like feeling of the infected vein ; (*g*) beginning neuroretinitis. A majority of these symptoms should be present.

"2. Indications for ligation after exposing the sinus and recognizing it, but before opening it : (*a*) The presence of a clot extending well down into the bulb and disintegrated in its lower portion (as indicated by the aspirator), associated with distinct pyæmic symptoms, although metastases are absent; (*b*) the display by the sinus of respiratory movements would render probable the admission of aërial embolism to the heart unless the vein were first tied.

---

[1] Therapeutic Gazette, from Practitioner, May, 1899.

"3. Indications for ligation after exposing and opening the sinus: (*a*) The presence of a large thrombus extending down into the bulb and having undergone purulent liquefaction in the deep, bulbous portion, which may not have been diagnosed until the sinus was extensively opened; curetting deeply in the neck under such conditions is fraught with imminent risk to the patient unless the vein is tied; (*b*) inability to re-establish the circulation from below, whether the clot has or has not disintegrated and whether or not there has been tenderness in the neck; (*c*) inability to re-establish the circulation from either direction has aroused some discussion as to the advisability of ligating both jugulars."

Operations for Trigeminal Neuralgia. Some of the highest surgical authorities advocate the operation of removal of the Gasserian ganglion; others oppose it. That complete and apparently permanent relief may follow its performance seems certain, and Keen's report is convincing, but the operation is difficult and should only be attempted by a man skilled in cranial surgery. An unskilled operator will probably fail to remove the entire ganglion. The mortality is considerable. Tiffany's table of 108 cases shows 24 deaths, a mortality of 22.2 per cent.

The admirable study of Keen and Spiller[1] takes strong ground in favor of the operation in certain cases. This paper was noted in PROGRESSIVE MEDICINE last year. Keen has operated on eleven cases, and although he is a believer in the operation, he is impressed with its difficulties and dangers. He thinks the ganglion should only be removed when we have exhausted our resources in peripheral operations.

The elder Senn absolutely disbelieves in the operation, and states that it will soon become an obsolete procedure.

Coelho[2] says this operation should be regarded as a last resort.

Jacob[3] believes in the operation, but not by the Hartley-Krause method. He resects a portion of the external orbital wall in order to reach the superior maxillary nerve, follows the nerve up to the foramen rotundum, trephines, finds and removes the ganglion, and replaces the osteoplastic flap.

---

[1] American Journal of the Medical Sciences, November, 1898.

[2] Revue de Chirurgie, May 10, 1899.

[3] Bulletin de l'Académie de Médecine, Paris, July 4, 1899.

J. Hutchinson, Jr.,[1] says the testimony is positive that complete removal of the ganglion cures the neuralgia permanently. He discusses the relative advantages and disadvantages of the pterygoid and the temporal routes.

N. B. Carson[2] says that in many cases undoubted relief, and in some cases cure, has followed resection of branches of the fifth nerve; hence, "If only one branch is involved and the disease is not of long standing, the affected branch should be removed and as much of it as possible; but if more than one branch is involved, and especially if the tic douloureux has been of long standing and very severe, we should remove the ganglion entire, if possible, all other means of relief having failed."

William Rose[3] has written an impressive and important article on "The Practical Value of Extensive Removal of Nerve-trunks in the Operative Treatment of Trigeminal Neuralgia." Mr. Rose was the first to propose and execute removal of the ganglion. He says "that by either route the intracranial operation is both dangerous and difficult, and should, therefore, be reserved as a last resource for desperate and intractable cases that have resisted all other or have recurred after previous extracranial operations."

Influenced by this conviction, Mr. Rose has made his extracranial operations more thorough than was formerly his custom, and his results have been most gratifying. He follows Thiersch's suggestion—that is, frees the nerve from its connections, and by means of a pair of forceps applies torsion and draws out a large piece of the nerve. In most of Rose's recent cases the chief painful areas were in the distribution of the second and third divisions, the ophthalmic branch being sometimes affected by radiation. Even when the ophthalmic branch was so affected the pain in it passed away after dealing with the other two nerves. Rose considers minor operations on peripheral nerves worthless, and attacks the main trunks as they leave the cranium. The second division should be operated upon first, and the third division should be attacked several weeks later. In operating upon the second division it is necessary to divide the nerve behind Meckel's ganglion (Fig. 13). Rose operates by a modification of the Braun-Lossen method, reaching the nerve through the temporal and pterygoid fossæ.

"EXPOSURE OF INFRA-ORBITAL FORAMEN. A curved incision with the concavity looking upward is made immediately over the foramen, which is situated on a line drawn from the supra-orbital notch to the upper first bicuspid. The nerve is isolated and a fine ligature placed round it. The roof of the infra-orbital canal is carefully opened up by a fine saw or chisel and the nerve traced back, the ligature remaining *in situ*. The wound is now covered with a piece of cyanide gauze and the next step of the operation proceeded with.

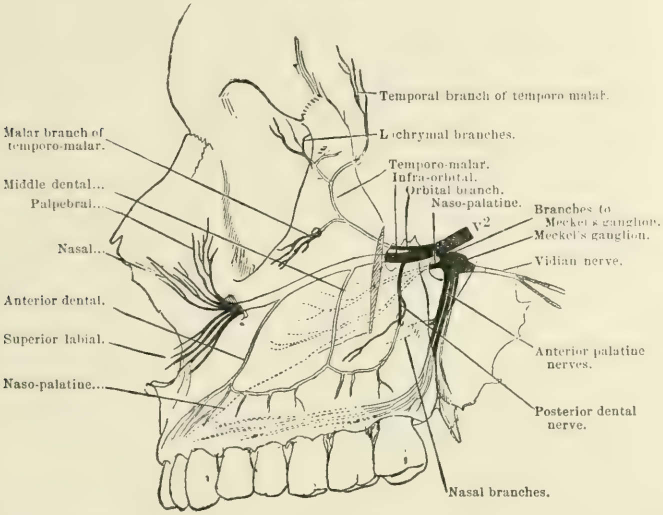
---

[1] British Medical Journal, November 5, 1898.

[2] St. Louis Medical Review, March 18, 1899.

[3] Practitioner, March, 1899.

FIG. 13.



Distribution of second, or superior maxillary division of fifth nerve.

"INCISION FOR REACHING THE SPHENOMAXILLARY FOSSA. In order to avoid any unsightly scar and to give as much freedom for subsequent work as possible I map out a skin-flap in the following direction: Entering the knife a little below the external angular process of the frontal bone (Fig. 14, *c*), and carrying it backward along the zygoma, it passes down in front of the ear over the parotid region to just above the angle of the jaw, and then curves forward for about two inches. Two transverse nicks are made at the centre of each curve, to act as guides in subsequently suturing the skin. The flap thus outlined is carefully dissected forward, and should consist of skin and subcutaneous fat only, Stenson's duct and the branches of the facial nerve being thus avoided. Should a small follicle of the gland be encroached on it is of little importance, though it may lead to some salivary leakage from the wound for a time. The flap, wrapped in gauze, is temporarily stitched to the side of the nose, and the bleeding from the superficial vessels is controlled by Spencer Wells' forceps and ligature.

"EXPOSURE AND DIVISION OF ZYGOMA. A transverse incision is made through the tissues immediately over the zygoma, which is exposed by means of suitable raspatories. Two holes are next drilled at the root of the process, a quarter of an inch apart, so as to give room for a saw-cut between them (Fig. 15); two more holes are drilled anteriorly through the zygomatic process of the malar bone. For this purpose either an electric or a very fine hand-drill may be employed, and the holes should be just large enough to allow the passage of a No. 22 silver wire for subsequently fixing the bone in position. The zygoma is then divided by a saw; the anterior saw-cut should slant from above downward and forward, in order to give as much space as possible, and the posterior should divide the process close to its root.

"The zygomatic arch is displaced downward and backward after division of the temporal fascia attached to its upper margin, but in order to free it completely the fibromuscular connections of the masseter to the malar bone must be severed. By this means the tendon of the temporal muscle is exposed, and after drawing it backward with a retractor (Fig. 16, *b*) and pulling away a certain amount of loose fat, the pterygomaxillary region is brought into view. In some cases the coronoid process is so large that, even with the mouth gagged open, it obstructs further progress; when this is the case I cut it off with a pair of bone-cutting pliers and utilize it to hold the temporal tendon upward and outward during the remaining steps of the operation.

FIG. 14.

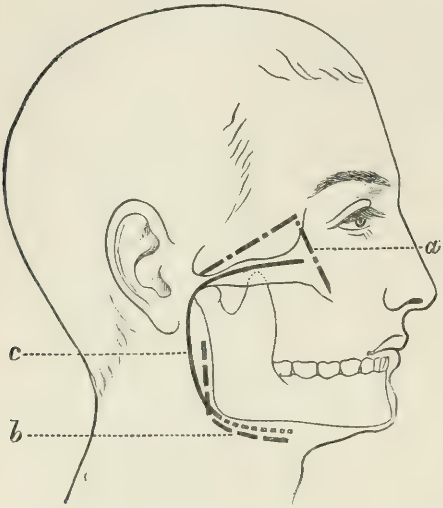


FIG. 15.

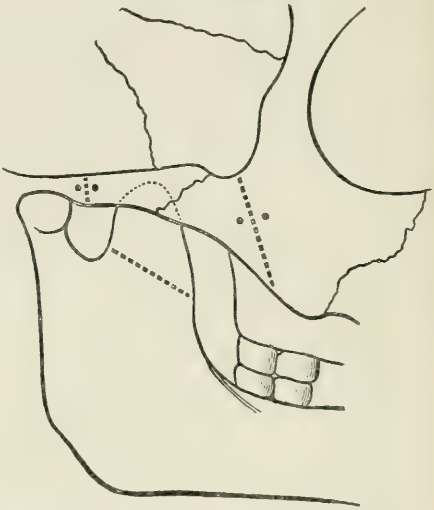


FIG. 14.—Diagram of side of face, showing (*a*) the original Braun-Lossen incision; (*c*) my own [Rose] incision for dealing with the roots of the fifth nerve.

FIG. 15.—Diagram of zygoma and lower jaw *in situ*, showing position of drill holes and saw-cuts.

"Search must now be made for the *internal maxillary artery* (Fig. 16, *c*), which runs a somewhat variable course, being either superficial or deep. When found, two ligatures are placed upon the trunk and the vessels divided between them. Possibly the vein may also require ligature. This facilitates the subsequent dissection, but the vessel may be again opened into in the deeper parts, and require further attention.

"The index finger should next define the position and direction of both the *sphenomaxillary and pterygomaxillary fissures*, the latter running perpendicularly and the former almost at right angles to it. These are not clearly seen until the fibres of the external pterygoid have been rasped off the great wing of the sphenoid and the root of the external pterygoid process. At the junction of the two fissures and lying posterior—*i. e.*, on the edge of the great wing of the sphenoid—a bony prominence is almost constantly found overhanging the entrance to the sphenomaxillary fossa, and this should be chiselled away so as to give easier access to the nerve which lies under it, but more deeply placed. Before proceeding further bleeding should be stanched as far as possible by small pieces of sponge held on long forceps and wrung out of hot lotion. The sides of the wound are held open by suitably shaped retractors and the nerve sought for and lifted on a squint hook. It is iden-

FIG. 16.

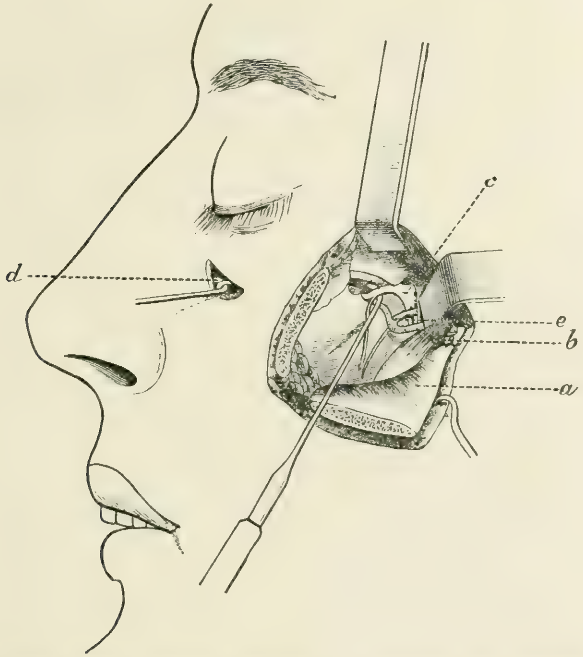


Diagram of Braun-Lossen operation, showing (*a*) zygomatic arch divided and turned down; (*b*) temporal tendon arising from coronoid process held back by retractor; (*c*) superior maxillary nerve and Meckel's ganglion; (*d*) infra-orbital nerve at emergence from canal; (*e*) internal maxillary artery.

tified by means of its white appearance and the direction it is taking. It is next seized with a pair of fine Spencer Wells' forceps and steadily twisted in such a way as to detach it proximally as near the ganglion as possible. This done, the distal end is pulled and twisted so as to draw the nerve back through the infra-orbital canal, where it has been already detached. In this way quite an inch and a half of the nerve-trunk can in many cases be brought away.

"Steps are now taken to close the wound; if the coronoid process has required division, experience has shown that it is better to remove it and the extremity of the temporal tendon rather than to fix it in its original position, the muscle on the other side being quite sufficient for carrying on the movements of the jaw. The zygomatic arch is next wired in position, and the temporal fascia brought together by fine buried catgut sutures."

The skin incision is united. If there is any oozing a fine drainage-tube should be inserted. The drainage-tube and lid stitch are removed in forty-eight hours.

Rose has never had necrosis of the zygoma follow, but the movements of the jaw are sometimes impaired.

If the pain involves both branches the third division should be attacked after a few weeks. In this operation Rose removes the entire coronoid process, finds the inferior dental and lingual nerves, traces them up to the foramen ovale, twists them off as close to the ganglion as can be effected, and removes them from below.

Rose has operated by the above plan on forty cases without a death. The results are most satisfactory, and he has employed this operation successfully of late on several cases in which a few years ago he would have removed the ganglion.

Such testimony from a pioneer in the operation of removal of the ganglion should command the most careful consideration of the profession, and will greatly strengthen the conviction of those who believe that the more formidable operation is very rarely necessary, and is to be regarded as the last resource.

INFECTIOUS DISEASES, INCLUDING CROUPOUS PNEUMONIA.

By FREDERICK A. PACKARD, M.D.

THE ACUTE INFECTIOUS DISEASES.

With advancing knowledge of bacteriology and the increasing insight into clinical phenomena obtained by its means, the field of the infections is growing to such an extent that it is almost impossible to define the limits of this class of diseases. There are, however, a certain number of well-defined and constant symptom-groups which enable us to divide the subject into certain special diseases in which the cause has been definitely and distinctly determined or the character of transmissibility has rendered certain their infectious nature. These, of course, are what are usually spoken of as the infectious diseases, and were so defined even before there was any vigorous attempt made to discover the peculiar etiological factor of each. These alone are properly grouped under the heading of infectious diseases, although there is growing proof that such ordinary illnesses as coryza, tonsillitis, and certain forms of bronchitis should be placed in this class. The surgical infections—that is to say, the results of the entrance of micro-organisms through wounds produced by injury or operation—are usually considered by themselves, while the diseases such as those mentioned above (coryza, tonsillitis, and bronchitis) are usually considered with the other diseases of the portion of the body with which they are concerned. Within recent years pneumonia has been accepted as an infection, and has been placed in a class far more appropriate than is that of diseases of the lungs; while rheumatism, being a general disease, has been classed among the infections because it was evidently improper to classify it, as has been previously done, with gout and the other disorders of metabolism, and because, as will be shown later, there is good reason for attributing it to infection. Its etiological factor or factors have not been definitely discovered, yet the same may be said equally of other well-recognized infections, such as measles and scarlatina.

Immunity and its Production. While having a far wider application than to the typical infections coming under the present section, the article by Manfredi,[1] dealing with immunity and the manner by which the body combats infection, is one that has an important bearing upon all of the infections, and is, therefore, noted here. Manfredi's endeavor was to institute a series of experiments to determine the possibility of the existence of a latent microbism in the lymphatic glands, and to establish its importance and its relations. In order to investigate this the lymph-glands and other organs of a large number of animals, including man, were examined as to their bacterial contents. The result of this series of experiments was that in almost every case a growth of organisms was obtained from the lymphatic glands, while the other organs were either sterile or showed a rare growth. He concludes from this that these glands are, in normal animals, the exclusive and usual seat of a latent microbism. The greatest number of microbes was found in the subcutaneous glands, then in the peribronchial, and finally in the mesenteric groups. These micro-organisms were found to have preserved virulence to a greater or less degree. In order to determine in what way the bacteria come to the glands, and by what means they are retained there, Manfredi instituted experiments by rubbing cultures of micro-organisms into the skin and by injection, and found that rich growths of organisms developed in cultures from the glands draining the part experimented upon, but not from other organs. He found that the bacteria retained their pathogenic virulence up to the fourth or fifth day of their residence in the gland. He concludes that if the number of bacteria is not too great the lymph-glands act as filters.

Manfredi found also that different micro-organisms retain their virulence for varying times after their entrance into the lymph-gland. For example, the staphylococcus pyogenes aureus retained virulence for forty days in the guinea-pig, for thirty days in the dog; typhoid bacilli retained their virulence for sixty days in the guinea-pig, for twenty days in the dog; while anthrax bacilli retained their virulence for only fifteen days. These experiments are of interest from two points of view: In the first place, as a possible explanation of the occurrence of relapses; in the second place, because they show the varying capacity of different animals for lessening or abolishing the virulence of organisms in the lymph-glands, and may possibly explain to some extent the phenomenon of natural immunity. This author lays stress upon the fact, which has been previously pointed out by others, that in the lymph-glands the predominating variety of leucocytes is the small mononuclear—a non-phagocytic form—but that other organs contain large mononuclear or polynuclear leucocytes which are phagocytic. This may explain the longer residence of micro-organisms within the lymphatic glands, their disappearance from other organs being earlier accomplished. Lymph is not antiseptic, as is the tissue-juice of other organs, so that a bactericidal influence cannot be at work to limit the growth.

---

[1] Archiv für pathologische Anatomie und Physiologie und für klinische Medecin, 1899, Band clv.

Another interesting series of experiments was instituted by the repeated passing of cultures through lymph-glands, performed by inoculating animals with cultures from the glands of other animals and repeating inoculation with the organisms obtained from these second animals, and so on through a series. Here Manfredi found that the diplococcus of pneumonia, the bacillus of typhoid, staphylococcus pyogenes aureus, anthrax bacillus, plague bacillus, and the tubercle bacillus all lost their virulence; whereas this was not the case when the bacteria were passed through other organs. In the case of the tubercle bacillus the glands did not entirely deprive the organism of virulence, but apparently weakened it, and caused a milder form and slower course of the disease produced by inoculation. This point is of importance in connection with the manifestations of tuberculous infection of the lymph-glands.

By a series of experiments with inoculation into the anterior chamber of the eye it was found that a much larger dose was necessary to quickly kill the animal than when injection was made into any system other than the lymphatic, and that by such injections immunity to a high degree was conferred upon the animal. This was true for all diseases experimented with except diphtheria. This is explained by the fact that as the bacillus of diphtheria does not disseminate itself through the glands, we are practically injecting simply a toxin; whereas in the other diseases experimented with the bacillus disseminated itself through the tissues, as in the case of the anthrax bacillus, or as in the case of the typhoid bacillus quoted above, by disseminating itself through the tissues and by the absorption of its toxin.

Manfredi concludes from these and other experiments, which cannot be detailed here, that, at least in the case of anthrax and typhoid bacilli, the lymph-glands do possess a specific latent microbism, and that by virtue of this they confer a general immunity upon the organism, possibly because of the fact that the body in general becomes immune to the presence of organisms contained within the glands.

The infrequency of evidence of former tuberculous (scrofulous) involvement of the superficial cervical glands, in cases of pulmonary tuberculosis, is a curious fact that has received but little attention. For some years I have been looking for evidence of previous glandular infection among the large number of cases of pulmonary tuberculosis admitted to the Philadelphia Hospital. For the first time I last winter saw a man with advanced cavity formations and numerous scars on the neck, due to breaking down of the cervical glands in childhood. It is possible that the general immunization of the organism by the retention of tubercle bacilli within the glands, such as can be presumed to be possible according to the experiments of Manfredi, may be accountable for the infrequency of the association. Of course overwhelming infection by the tubercle bacillus, especially if associated with pyogenic organisms, could break through the lymphatic barrier, producing dissemination of the tubercle bacillus and either distant or generalized tuberculosis. This would, however, probably take place soon after the infection.

In a later communication Manfredi, in conjunction with Viola,[1] pursues the subject of the protective action of the lymphatic glands, and sums up as follows: The lymphatic gland system has a natural power of resisting the virus (anthrax and typhoid bacilli and diphtheria toxin) which exceeds the resisting power of the other organs of the body. To the lymphatic gland system there must be ascribed a real influence in the production of immunity. Through these it is possible to produce immunity to anthrax in the guinea-pig (an animal which cannot be rendered immune in any other way) and in the rabbit (in which animal immunization is otherwise difficult). This is the case with typhoid infection of these animals, whereas with diphtheria toxin it is very difficult to produce immunity in the same way. The mechanism of immunization through the lymphatic system consists only partly in a general protection by other methods (phagocytosis, bactericidal power). Manfredi and Viola conclude that it is possible to explain immunity to the whole organism by this immunizing power of the lymphatic glands for organisms retained in them.

Transmission of Infectious Agents by Insects. In the *Johns Hopkins Hospital Reports*, 1899, vol. viii., Nos. 2 and 3, George H. F. Nuttall has written a valuable monograph bearing upon the question of the transmission of disease by insects, arachnids, and myriapods. This question has such an important bearing upon all of the infections that a brief review of the work performed in this line may be of interest. The question of the transmission of a disease by flies is one that has excited considerable comment during the past year in connection with the diseases affecting the American army during the Spanish-American war. If typhoid fever, for example, can be transmitted by flies, an important point in camp hygiene is the protection of the excreta so that they are inaccessible to flies, as is also the proper guarding of food materials from contact with these insects. Not only in connection with camp hygiene, but in hospital work this question is one of extreme importance. At the present time the dressings applied to wounds are of such character that there is but little danger of infection being carried from one patient to another. In former times, when it was no unusual sight to see maggots actually swarming in superficial wounds, the possibility of the spread of various diseases by their agency, when developed into mature form, can readily be appreciated. While the present treatment of wounds effectually prevents the access of flies, there are many possibilities in this direction, as in the case of the infectious forms of ophthalmia, and in a more purely medical sense the transferrence by these insects of the specific cause of pneumonia, tuberculosis, and typhoid fever. It is important, therefore, that the question of this transmission by means of insects should be placed upon a firm basis. This certainty of knowledge has been much forwarded by the work of Nuttall, not only in the monograph to which reference has been made, but by his individual work in this field of research.

---

[1] Zeitschrift für Hygiene und Infectionsk., 1899, Band xx., Heft 1, 64.

In regard to anthrax, Nuttall concludes that ordinary flies may carry about and deposit the bacillus of anthrax in their excrement or may cause infection by their contaminated surfaces coming in contact with either wounded surfaces or food. In regard to the possible rôle played by bed-bugs in the transmission of anthrax, he concludes that infection through the bite of a bug either does not occur or is exceptional, although he states his belief that infection might occur if the bug were crushed shortly after it had come in contact with material carrying anthrax bacilli, when the scratching of the part would successfully inoculate the skin with the anthrax bacilli derived from the surface of the insect. Since Nuttall's experiments Joly has confirmed the former's conclusions as to the negative result obtained by causing infected bugs to suck the blood of healthy animals.

The question of the transmission of anthrax by fleas has been studied by Nuttall, who found that anthrax bacilli died off rapidly in fleas, and that these insects, therefore, cannot play much of a rôle, if any, in the spread of the disease.

At the present time the spread of plague is of much interest, and light thrown upon the dissemination of this disease is peculiarly valuable. Nuttall, therefore, has experimented with flies infected by feeding them with the crushed organs of animals dead of plague. The insects were found capable of living for several days after feasting upon plague-infected organs, and it was found that they contained virulent bacilli for forty-eight hours or more after their infection. Careful consideration has been given to the possibility of the spread of plague by various insects. Nuttall started a series of experiments to determine the possible rôle of bed-bugs in this connection, and found that the bite of the bug apparently had no effect in producing disease, except in the indirect manner which he pointed out as possible in the case of anthrax. The question of the spread of plague by fleas from the body of rats dead of the disease, has been considered, and it has been found that fleas taken from rats dead of plague contain virulent bacilli. Nuttall cites some inconclusive experiments that were made to determine the truth or fallacy of this theory. He says that while the rat-flea and the mouse-flea do not ordinarily use man as a host, it is possible that the death of their natural hosts in large numbers during epidemics of plague may cause these insects to seek the body of man.

The spread of yellow fever by insects, especially mosquitoes, first propounded by Finlay in 1881, is evidently considered by the author to be still not proven. Nuttall considers that the evidence of the spread of cholera by flies is convincing, and that typhoid fever may readily be communicated in the same manner. He quotes the experiments of Celli showing the virulence maintained by typhoid bacilli which had passed through the digestive canal of insects having access to typhoid excreta.

The adhesion of typhoid bacilli to the feet, proboscis, and wings of flies coming in contact with stools of typhoid patients, may be an important means in the spread of this infection through the later deposition of these bacilli upon food material within reach of the insects.

Recently, Coplin[1] has shown that flies, bed-bugs, and roaches allowed to travel over colonies of bacillus typhosus are capable of being passive carriers of the micro-organisms for at least forty-eight hours—that is to say, they can cause the growth of bacilli when placed upon culture media forty-eight hours after they have come in contact with cultures of the typhoid bacillus. While not directly analogous to animal experimentation, these experiments have a strong bearing upon the question of infection of food materials by flies having access to matter containing typhoid bacilli.

The part played by the mosquito in filarial disease has been conclusively proven by Manson, while the part played by this insect in the life-history of and infection by the plasmodium, as first suggested as possible by Laveran and later urged by Manson, can now be considered definitely proven through the labors of Ross, Bignami, Bastianelli, and Grassi. This subject was fully considered and summarized in the section upon Infectious Diseases in the corresponding volume of PROGRESSIVE MEDICINE last year, while some reference to its later developments will be found in this volume under the heading of Malaria.

Examination of the Blood in the Infections. Under the general heading of infectious diseases it might be well to mention the important paper by Franklin W. White[2] regarding the bacteriological examination of the blood in various infectious diseases. In the literature of the infections contradictory reports are made in regard to the different micro-organisms in the blood obtained during life and after death. Post-mortem examination of the blood is always open to suspicion because of the known rapidity with which various micro-organisms gain access to the tissues, even though autopsy be performed soon after death with the body kept under the most favorable conditions, while the examinations made during life from the blood obtained by pricking the finger are often found so contradictory that we must conclude that thorough sterilization of the skin is an extremely difficult matter. In later work, with the use of the more thorough method of obtaining blood during life by puncture of a vein, many of the results previously reported have been shown to be erroneous. The method employed by White in his investigations was as follows: The skin about the elbow was carefully scrubbed with soap and water, alcohol and ether. A fillet was then tied around the upper arm and 5 c.c. of blood were removed by a sterile syringe, the needle of which had been inserted into the distended vein. Ethyl chloride was used to prevent pain of puncture. In ninety-two cases suffering from various diseases a positive result was obtained in twelve examinations, while in thirty-five cases in which during life the blood was found free from bacteria, a positive result was obtained in four cases shortly after death. The subject is mentioned here in order to draw attention to the fallacies which may arise from imperfect technique in the ante-mortem examination of the blood and to the necessity for care in drawing conclusions as to the probable bacterial contents of the blood during life from the findings made on examination at autopsy.

---

[1] Philadelphia Medical Journal, June 10, 1898.

[2] Journal of Experimental Medicine, May–July, 1899.

ACUTE ARTICULAR RHEUMATISM.

Etiology. The placing of this disease among the acute infections is in accordance with the most generally accepted view as to its nature. The humoral and the nervous theories are now believed to have no foundation. The humoral theory was chiefly based upon the supposed relationship between articular rheumatism and gout, but there is no connection between the two diseases except the fact that in both diseases the most striking feature may be the involvement of the joints. The theory of the production of acute articular rheumatism by the excessive formation of lactic acid was in line with the supposed relationship of these diseases. The occurrence of articular pain with swelling, in a few cases of diabetes mellitus treated with large doses of lactic acid, and the supposed positive results of experimental injection of lactic acid in animals, are in reality the only props to the lactic acid theory. Even supposing that the excessive presence of lactic acid caused these results, the latter were not in any way comparable to the disease in question. Arthritis is not the only feature of acute articular rheumatism, and even the exciting of joint inflammation by excessive amounts of lactic acid would merely tend to prove that the articular manifestations of acute articular rheumatism might be attributed to that material produced in excess during the progress of this disease. In so far, and no further, the lactic acid theory may be permitted to retain a place in our idea of rheumatism.

For the nervous theory even less can be said. The occurrence of arthropathies in certain degenerative lesions of the spinal cord and nerve injuries is the only circumstance lending support to this theory. That the joints should undergo degenerative changes with awkward attempts at repair in diseases of the nervous system is not to be wondered at when we remember the constant liability to injury which is present in the use of the joints, and what in health amounts to simply functional activity may, in a joint whose trophic condition is disturbed, act as repeated traumas. The existence of special joint centres has never been proved, nor have valid arguments in favor of their existence ever been advanced. The supposed relation of rheumatoid arthritis to rheumatism has seemed to lend some support to this view, yet the two diseases—rheumatoid arthritis and acute articular rheumatism—are widely different in their mode of onset, their symptoms, signs, course, prognosis, treatment, and, it is believed, in their etiology. That the joints are involved in both, that in both there is a tendency to muscular wasting in the neighborhood of the diseased articulations, and that there is a tendency to diaphoresis in one with profuse diaphoresis in the other, are facts that have been adduced in favor of their relationship. With these points excluded all resemblance between the two diseases ceases. That occasionally rheumatoid arthritis may follow acute articular rheumatism is not surprising, inasmuch as the former disease would be presumably aided in its course by the joints having formerly been the seat of a morbid process, even though after acute articular rheumatism the recovery of the joints is, as a rule, perfect. Were there any nearer connection between the two ailments, rheumatoid arthritis should more frequently follow the acute disease.

There is a class of diseases that, so to speak, form an apparent connecting link between acute articular rheumatism and rheumatoid arthritis—viz., the subacute polyarthritis affecting the smaller joints, accompanied by fever and with enlargement of the lymph-nodes. This condition has points of resemblance to each of the diseases in question; but there is good reason for believing that these cases are not a more active form of rheumatoid arthritis occurring in a young person, but are in reality instances of infectious arthritis secondary to some chronic surface lesions of the skin or, especially, of the mucous membranes, giving entrance to some organism or organisms capable of exciting arthritic lesions resembling those so long known and so frequently seen as the result of gonorrhœa and other infections.

The secondary arthritis of well-recognized infections, such as gonorrhœa, scarlatina, and pyæmia (the so-called pseudorheumatisms), have given rise to much confusion in our nomenclature. The very names, "gonorrhœal rheumatism," "scarlatinal rheumatism," and "pyæmic rheumatism," give at the same time a false idea of the nature of the process and also a possibly valuable suggestion as to the nature of acute articular rheumatism. It were better to call these conditions by a descriptive name, indicating merely what we know to be present—gonorrhœal arthritis, scarlatinal arthritis—rather than to dub them with a name about which our ideas are still so ill-defined that such things as names can influence our judgment.

In addition to this class of diseases, more or less artificially linked with rheumatism, we have a variety of heterogeneous affections, all characterized by pain, and, apparently, for that reason called "rheumatic." While it may be well to have some such convenient term as rheumatic to employ in talking to the laity, it would be well were all of the affections now termed "rheumatic" renamed in accordance with a less ill-defined etiological adjective. Because lumbago is painful it is called "rheumatic;" wry-neck is sometimes designated as rheumatic, apparently simply to distinguish it from the painless forms of that deformity, while there is not the slightest evidence showing a connection between acute articular rheumatism with the various vague joint pains designated rheumatic. It would seem that some more appropriate adjective should be selected to apply to these affections, or else that we should restrict the term rheumatism and the adjective rheumatic to these disorders and to choose some other term to designate acute polyarthritis appearing apparently independently of the well-recognized infections. Probably the latter alternative would be the better, inasmuch as the term rheumatism is in itself as vague as are the various disorders mentioned above. Not every arthritis is rheumatic, nor, as will be more distinctly referred to in what follows, are authors in accord as to every rheumatism being even remotely associated with arthritis.

The phenomena of acute articular rheumatism are clinically so characteristic that the disease deserves to be classed as a distinct morbid entity. The abrupt onset, often in the midst of perfect health, of chill followed by high temperature, coated tongue, free sweating, the appearance of sudamina, often accompanied by other skin lesions, the affection of the joints, now of one part, now of the other, are certainly indicative of a severe illness affecting not one, but every part of the organism. The clinical picture approaches more nearly that of pyæmia than any other recognized disease. In both we have high but irregular fever;

in both there is profuse sweating, while there is the same tendency to joint involvement and visceral implication in one as there is in the other. In pyæmia we have added to the picture the results of metastatic (embolic) abscesses in various organs, as well as the more malignant results produced by visceral involvement in pyæmia; while in the joints the lesions are not fugacious and do not pass away without leaving more or less permanent evidence of the attack. In pyæmia we have circulating in the body physical bodies whose biological characters have been capable of study, while in rheumatism the evidence is rather in favor of the material causing the articular manifestations being impalpable and of a chemical nature rather than having appreciable physical characters.

For a long time efforts have been made to discover the presence of some definite and specific micro-organism in cases of acute articular rheumatism, and a large mass of literature has accumulated relative to the bacteriological examination of various forms of arthritis. While this work has thrown a vast amount of light upon arthritis of various kinds and has served a distinctly useful purpose, a great deal of the work cannot be considered as having a bearing upon the disease in question. The infectious arthritis of pneumonia, of gonorrhœa, of erysipelas, and of a large number of well-recognized infections, is not acute articular rheumatism. It is an inflammation of the structures of the joint or joints involved through the lodgement there of the specific cause of the primary infection. Thus the bacteriological examination of the inflamed joint of a patient with pneumonia is apt to reveal the presence of the specific cause of that disease, and enables us to more thoroughly know the natural history of the disease in question and the liability to joint infection by the pneumococcus; but such a discovery need have no necessary bearing upon the subject of a totally different disease, such as acute articular rheumatism. On this account many of the records of the finding of the supposed cause of the latter disease have to be ignored in considering this question in etiology. Whether this disease is due to a specific organism—one that is peculiar to itself—is not decided.

Bacteriology. A review of the whole literature of the subject of the bacteriology of acute articular rheumatism would occupy much space, and a *résumé* of the stepping-stones so far as bacteriological work has progressed is all that would be appropriate here. Many of the earlier reports are manifestly marred by improper technique and by the undeveloped state of knowledge regarding cultural and staining methods, and it is probable that in the future improvements in both of these may give us even more definite results.

In 1883, Babes[1] found bacilli and cocci in the synovial fluid of a patient dying of parenchymatous nephritis in the course of acute articular rheumatism. The value of the observation is diminished by the fact that there is indefinite mention made of a metastatic abscess, which would rule the case out of the category of acute frank articular rheumatism.

---

[1] Archives de Physiologie normale et pathologique, 1883.

In 1885, Wilson[1] examined a case dying of endocarditis in the course of rheumatism. In the pericardial fluid he found a number of organisms which he described as "very small, non-nucleated rods, which take the pink stain. They are so small that I took them first for micrococci." Cultures on ascitic fluid gave a similar growth.

Guttmann,[2] in 1886, reported a case that has been widely mentioned, but which has some features that throw doubt upon its being a case of true rheumatism. It concerned a fourteen-year-old boy, who suddenly developed acute pain in the thigh. Five days later pain in the right knee developed, and on the eighth day pericarditis with effusion. The pericardium was aspirated, but death occurred. At autopsy there were found a fibrino-purulent exudate in the pericardium, many purulent foci in the kidneys, some small abscesses in the muscles of the left chest, and the right knee-joint contained sero-fibrinous exudate. Staphylococcus pyogenes aureus was obtained from the exudates in pure culture. The case resembles one of pyæmia in its course and post-mortem findings, while the existence of a primary osteomyelitis of the femur, with secondary involvement of the joint and metastatic abscess formation, seems not an impossible explanation.

Mantle,[3] in 1887, reported a more positive finding in a case of acute articular rheumatism. In the articular fluid removed by aspiration of the knee-joint he found micrococci and small bacilli. Cover-glass preparations of the blood showed micrococci singly and in pairs. He states that in each of sixteen cases he found bacteria in the blood.

Popow,[4] in the same year, made cultural examination of the blood of an acute case of rheumatism, and obtained a citron-yellow growth of cocci, single or in chains, and "larger than the cocci found in erysipelas." Inoculation of the growth into the jugular vein of two rabbits caused "acute articular rheumatism, with pericarditis and endocarditis." In the abstract of Popow's article, the original being unobtainable, there is no description of the symptoms produced in the animals, so that I cannot tell how closely the experimental disease resembled acute articular rheumatism. If the resemblance was close this experiment is unique.

Buday,[5] in 1890, found streptococcus pyogenes in the brownish-yellow bloody fluid from the shoulder-joint of a case of polyarthritis of some weeks' duration. He injected into the ear-vein of rabbits virulent staphylococcus pyogenes citreus and streptococcus pyogenes. If amounts sufficient to kill in twenty-four or thirty-six hours were used no alterations were found in the joints and no cocci were present in them. If the animals survived for a longer time Buday found in the articular cavities pus, and in the synovial membrane bloody effusion and microscopic abscesses surrounding bloodvessels containing clumps of micrococci. He thought these abscesses to be metastatic emboli. Buday concludes from these experiments and from observations upon cases of secondary arthritis that micro-organisms reach the joint-cavity only if the synovial membrane is the seat of metastatic abscess, necrosis, or hemorrhage. He also states that metastatic abscesses are frequent in the synovial membrane because its capillaries have very large endothelial cells projecting unusually far into the lumen; while rupture of these abscesses into the joint is favored by the superficial position of the capillaries in the synovial membrane and by the fact that the latter has no basement membrane. The observation last mentioned is of importance more in connection with the so-called "pseudorheumatisms" than with true acute articular rheumatism.

---

[1] Edinburgh Medical Journal, June, 1885.

[2] Deutsche medicinische Wochenschrift, November 18, 1886.

[3] British Medical Journal.

[4] Abstract in Wiener medicinische Presse, 1888, No. 5, p 162.

[5] Orvosi Hetilap, 1890, Nos. 39–42; abstracted in Centralblatt für Bakteriologie und Parasitenk., 1891, Band x.

G. Lion,[1] in the same year, found micrococci in pairs and chains in the articular liquid, pleural effusion, and heart blood of a case dying in the acute stage of acute rheumatism, and in two other cases found in the urine or by culture of blood obtained from the finger a streptococcus.

Bouchard and Charrin,[2] in 1891, found in the articular cavities or the surrounding structures staphylococcus alone six times, staphylococcus albus and aureus once, staphylococcus albus with staphylococcus aureus and a short bacillus once, staphylococcus aureus with a new bacillus once, and a negative result in two cases.

In the same year, Achalme[3] made the first of an important series of observations upon the bacteriology of rheumatism. This communication was based upon the examination of a man having acute articular rheumatism, who died on the second day of his illness with cerebral symptoms and high temperature. Aërobic and anaërobic cultures were made from the pericardial serum, synovial fluid, cerebro-spinal fluid, from the spleen, and from blood from the heart. The aërobic tubes were all sterile, as were those inoculated with synovial fluid, cerebro-spinal fluid, and spleen. The anaërobic tubes inoculated from the pericardium and from the blood of the heart gave an abundant growth of bacilli which produced a peculiar odor. The organism was slightly motile, smaller than the bacillus of anthrax, developed spores in old cultures, and took aniline dyes well. The same organism was found on direct examination of the pericardial fluid and in sections of the exudate on the mitral valves, and sections of the pericardium, but was not found in sections of the kidneys, liver, or spleen. Inoculation of guinea-pigs and rabbits gave no result except a temporary indisposition.

---

[1] Essai sur la nature des endocardites infectieuses.

[2] La Médecine Moderne, 1891, tome ii. p. 687.

[3] Comptes-rendus de la Société de Biologie, July 25, 1891.

Achalme[1] reported a second case of fatal rheumatism with endocarditis. He found the same bacillus in the blood of the heart, the pericardial fluid, the muscular tissue of the heart, the heart valves, and the subpericardial tissue. He found the same bacillus in the blood during life in six cases, four times alone, twice associated with micrococci. He again found the necessity of anaërobic cultivation. Some points of striking interest were developed in his work. The addition of lactic acid to the culture media facilitated growth, while the addition of small quantities of salicylate of sodium retarded or prevented development, a smaller quantity being required to do so than is the case with other organisms. In discussing a paper by Thiroloix in the same year, Achalme spoke of a later case which gave the same results as did his others, and he stated that he had found his bacillus in the blood of a living rheumatic.

The same bacillus was obtained by Carriere,[2] in 1898, in the blood from the cephalic vein and in the pleural exudate of a case of subacute articular rheumatism. The articular liquid in this case was sterile.

Rosenthal[3] examined the blood of seven cases and failed to verify Achalme's results in any way. On the other hand, Savtchenko[4] has found the bacillus of Achalme alone in four out of six cases. In a fifth case it was associated with streptococci, while the sixth was convalescent and gave no growth. Bettencourt[5] found it in one case during the past year.

Triboulet,[6] in 1892, got a negative result from attempts to cultivate organisms from the synovial fluid from a case of acute rheumatism, but on the same case grew staphylococcus albus and aureus from the pericardial fluid and staphylococci from the blood of the heart and inferior vena cava obtained at autopsy. In a second case he again found the articular fluid sterile.

---

[1] Comptes-rendus de la Société de Biologie, 1897; Annales de l'Institut Pasteur, 1897, and La Semaine Médicale, 1897.

[2] Comptes-rendus Hebdomadaire des Séances et Mémoires de la Société de Biologie, 1898.

[3] La Médecine Moderne, November, 26, 1898.

[4] Letter of A. Rovinsky, Boston Medical and Surgical Journal, November 17, 1898,

[5] Archivos de Medicine, t. ii., No. 2; abstract in Centralblatt für Bakteriologie, Parasitenk. u. Infectionsk., January 25, 1899.

[6] Revue de Médecine, August, 1899.

In 1893, Saint Germain[1] examined eighteen cases with entirely negative results as regards the articular fluid. Leyden,[2] in 1886, and Sahli[3] (working in the former's clinic), in 1893, reported the uniform absence of micro-organisms from the articular fluid, except for the occasional discovery of diplococci, which were regarded as due to accidental contamination.

Chvostek[4] found the articular exudate, obtained by puncture, sterile in all of twelve cases of rheumatism.

Thiroloix[5] examined the blood of two cases with acute articular rheumatism, and in both found the same organism as that described by Achalme in 1891. Later in the same year he reported a new case with the same result. In this paper he gives the result of some inoculation experiments with the bacillus, in which he produced endocarditis and sero-fibrinous pleurisy, but no arthritis.

Triboulet,[6] in conjunction with Coyon and Zadoc, reported a case of acute articular rheumatism complicated by endopericarditis and chorea. From the pericardial liquid they obtained streptococci on anaërobic culture. From the blood of the inferior vena, a fragment of diseased valve, and from the lumbar cord, a bacillus resembling that described by Thiroloix grew in anaërobic culture. In a later communication Triboulet and Coyon[7] report that in six cases examined they found Achalme's bacillus but twice, while a diplococcus was constantly discovered. In five additional cases the diplococcus was found. In severe cases direct examination of the blood showed the organisms present in large numbers in each field. Their conclusions are as follows: In eleven consecutive cases of acute articular rheumatism of varying degrees of severity a diplococcus was found. Direct examination of the blood showed the diplococci in varying numbers. Rheumatism is a septicæmia. This septicæmia can be simple or complex, one, two, or three forms of micro-organisms being present in different cases, but the diplococcus described is always present and predominating. This diplococcus is the cause of the endocarditis of rheumatism. Intravenous inoculation of pure cultures of the diplococcus causes mitral valvulitis, and the diplococcus is present in the diseased leaflets.

Riva[8] experimented with culture media to which had been added synovial fluid, with synovial fluid alone, and with sterile synovia obtained

---

[1] Étude clinique et expérimentale sur la Pathogenie du Rhumatisme articulaire aigu.

[2] Deutsche medicinische Wochenschrift, November 25, 1886.

[3] Deutsches Archiv für klinische Medecin, Band li.

[4] Wiener klinische Wochenschrift, June 27, 1895.

[5] Comptes-rendus de la Société de Biologie, 1897.

[6] Bulletin et Mémoires de la Société Médicale des Hôpitaux, 1897.

[7] Ibid., 1898.

[8] Centralblatt für innere Medecin, August 14, 1897.

from the injured joint of a horse. In eight simple and ordinary cases of acute articular rheumatism, and in one complicated by pleurisy, pericarditis, and nephritis, he obtained growths on the media named, whereas on ordinary media no growth occurred. In all of the cases he obtained a growth from the knee-joint, in three from the blood, and in one from the pleural effusion. The growth was composed of roundish bodies of a size between that of a leucocyte and that of a large torula, and stained by ordinary means. Later these bodies disappeared and were replaced by two kinds of bacilli—one large, homogeneous, or segmented, immobile, and staining feebly; the other smaller, spore-bearing, and very movable. He concluded that these are the infecting agents in acute articular rheumatism.

W. Kühnau[1] examined the blood of sixty-seven cases of acute articular rheumatism, and only once found in the blood staphylococci proving pathogenic for animals. In this case the staphylococcus pyogenes aureus was the organism found. All of the other cases gave no pathogenic organism and, although in five he found non-pathogenic staphylococcus albus, in one non-virulent staphylococcus citreus, and in one staphylococcus aureus with slight pathogenic power, he looks upon these as accidental contaminations.

For some years Singer has been carrying on a systematic examination of the urine, blood, and joint contents in cases of acute articular rheumatism. In the blood he has obtained a positive finding in nine out of sixty cases, or 15 per cent. Among these there occurred staphylococcus pyogenes albus nine times; staphylococcus pyogenes aureus, with staphylococcus cereus albus, once; streptococcus pyogenes once; streptococcus conglomeratus once. The joint contents were examined thirty-one times in twenty-one cases; a positive result was obtained in four, and in two of these it was doubtful whether the growth actually came from the articulation. Singer attaches great importance to the examination of the urine and his results in this line. Eighty-five cases were examined, and in forty-nine a positive bacteriological finding was present in the urine. Of the micro-organisms found, staphylococcus pyogenes albus occurred alone in twenty-four cases; combined with other staphylococci in eight cases. Staphylococcus aureus occurred alone in two cases; streptococci alone in eight, and combined with staphylococci in five; while bacterium coli was found in two cases. Singer concludes, therefore, that rheumatism is a disease produced by the entrance of pyogenic micrococci into the organism, basing his conclusions upon the results noted.

These conclusions have been urgently combated by Chvostek and Kraus. Kraus particularly has shown the complete absence of significance of many positive findings in examination of the urine, while Chvostek has made a series of examinations, similar to those of Singer, in nineteen cases. The blood in sixteen cases was constantly found to be sterile. The articular fluid in seventeen cases was found to contain micro-organisms on only one occasion, and then bacilli in small number. No growth was obtained from the urine in ten out of fifteen cases, while in others no very definite conclusions could be drawn from the findings. In their monograph published in 1898 the authors sum up the results of their work and apparently clearly show that in a large number of different infections bacteria are found in the urine without reference to the nature of the disease; as, for example, the occurrence of staphylococci in the urine in malaria and during the fever which follows the injection of tuberculin. They also criticise the diagnosis in many of Singer's cases and reduce his percentage of 15 per cent. of positive findings to 8.2 per cent.

---

[1] Zeitschrift für Hygiene und Infectionsk., 1897, p. 541.

From the results of previous bacteriological work it can be seen that no definite conclusions are as yet to be drawn; the only organisms that could possibly be looked upon as a specific cause for acute articular rheumatism would be either the bacillus of Achalme or the diplococcus of Triboulet. A sufficient number of cases has not as yet been examined by others, with positive findings, to make us think that the results of Achalme and Triboulet are sufficiently established to prove that either of them has discovered the cause of this disease.

Should no specific organisms ultimately be found to be constantly present in this disease and to be present in no other condition, capable of isolation, cultivation, and of pathogenic properties when injected into animals, we need not abandon the idea of rheumatism being an infection. It has been suggested, with a considerable degree of probability, that rheumatism is not one individual disease, such as typhoid fever, for example, but that it is a group of symptoms and lesions that may be produced by a variety of organisms gaining access to the system. In that case, of course, no one particular organism would be discovered in every case of this disease.

An attractive theory is that rheumatism is a modified pyæmia—the view especially advocated by Singer. The resemblance of acute articular rheumatism in many ways to the results produced by the entrance of virulent pyogenic organisms into the body is in reality more one of degree than of nature. Experimental work to prove this connection between the two diseases, by injecting attenuated organisms into the animal body, has not been entirely convincing. However, an interesting fact has been brought out by Courmont in this connection—namely, that attenuated micro-organisms have a strong predilection for the joints. It is possible that the point of entrance of the rheumatic poison as compared with that in pyæmia may have something to do with this attenuation.

In a large number of cases of acute articular rheumatism there is a prodromal angina. It has been thought by many that this prodromal angina is an evidence of the entrance of the causative factor of rheumatism into the tissues of the body at the tonsils. If such is the case, and there is much to support the view, the lymphadenoid tissue beneath the mucous membrane of the fauces may possibly play a part in the attenuation of the micro-organisms and in the lessening of their virulence before reaching other tissues of the body—a theory that would be strengthened by the work of Manfredi (previously summarized) in connection with the lymphadenoid tissue of the lymphatic glands.

Another view as to the phenomena of rheumatism is that they are the results of the action upon the tissues not of a micro-organism but of its toxins. This theory would account for the absence of micro-organisms from the articular liquid in many carefully conducted examinations. It would also account for the fugacious character of the joint-manifestations and for the complete recovery of the articular structures without permanent lesion. In confirmation of this view we have the well-recognized liability of serous membranes to become inflamed through chemical materials in the case of uræmia. Still more striking is the effect produced in the joints by the injection of antitoxin in diphtheria.

It would seem at the present time that the evidence can be summed up about as follows: Rheumatism is a disease produced by external agencies. While in many instances it seems to result from exposure to cold or wet, alone or in combination, there is no way by which we can explain the action of these factors except by their lowering the vitality and permitting invasion of the body, as is held to be the case with other well-known infections. The cause of rheumatism is, therefore, probably bacterial, but whether the disease is produced by one specific organism or may be produced by a variety of organisms is not as yet definitely determined. There are good reasons for believing that rheumatism may be a polymorphous disease—one which may be caused by many different organisms—and there is much to bear out the view that the most frequent cause of acute articular rheumatism is one of the forms of pyogenic cocci of attenuated virulence. Finally, it is possible that the articular manifestations and some of the other phenomena of acute articular rheumatism are due to the effect of toxins manufactured by the micro-organisms, the latter occupying a fixed position within the body, from which point their products are absorbed.

Within the last few years many articles have appeared bearing upon the relation between angina and rheumatism, while during the same time there have been reported numerous instances where rheumatism has followed some special lesion in places other than the throat, with such promptness as to give color to the supposition that in these particular cases the special lesion gave entrance to the poison, just as in many cases this entrance takes place through the tonsils. The varying percentages given by different authors in regard to the frequency of prodromal angina in rheumatism may be explained in several ways. In many cases on record the tonsils have shown no external sign of disease, yet where the case has ended fatally more or less serious disturbance has been found on examining the tonsils at autopsy. In many cases the tonsils are seen to be abnormal, although the patient has made no mention, in the history of the onset of the illness, of any trouble with swelling or other symptoms referable to the throat, and without calling attention to the fauces.

In addition to the fact that the tonsils may be the seat of serious pathological change without superficial evidence during life, it is to be borne in mind that in speaking of the tonsils we should not refer only to the palatal tonsils, which alone are visible on superficial examination, but we should also remember that the lingual and pharyngeal tonsils, in fact the whole of Waldeyer's ring, may act as portals of entry, just as do the bodies more frequently indicated by the name of tonsils. It will probably be more correct to speak of the mucous membrane of the throat rather than of the tonsils themselves as the portal of entry in cases of rheumatism. In another place I have recorded instances of endocarditis, erythema nodosum, and chorea following immediately upon an acute inflammation of the throat, and have there stated my belief that we should look upon these complications of tonsillitis not as being rheumatism or having anything to do with rheumatism except in so far as we consider that they, and acute articular inflammation, may follow infection of the body by micro-organisms or by intoxication through the entrance of toxins into the body by way of the mucous membrane of the throat and of the tonsils.

Treatment. The action of salicylates and preparations allied to them is looked upon as specific by most authors. With this view I would heartily coincide, believing that the salicylates do not only relieve pain and reduce temperature, but actually shorten the course of the disease and possibly, although this is a difficult point to determine, prevent the occurrence of complications. A possible explanation for the skepticism exhibited toward the salicylates by some whose opinion carries great weight, seems to me to be caused by this very specific action, and the supposed frequency of cardiac complications with relapses may be due to the fact that the salicylates do relieve pain and reduce temperature promptly, and that because of this prompt reduction of temperature and relief of pain patients are allowed to move about and to undergo exertion sooner than would be the case were their subjective symptoms less rapidly relieved. In addition to this, where rheumatism is uncontrolled by the salicylates, the disease is undoubtedly a more severe one; the patient is left weak and more languid, and consequently convalescence is slower and the heart, if damaged, can repair itself before the patient's general condition will permit of his even sitting up in bed. While impressions alone do not carry weight, neither can statistics aid much in determining this question of the frequency of cardiac lesions following rheumatism, and while statistics can be brought forward on either side with equal force, it would seem that the general impression is, that the salicylates do have a specific action in rheumatism, and that by their use cardiac complications are, to say the least, not increased in frequency.

DIPHTHERIA.

Treatment. The point of chief interest at the present time in regard to diphtheria is the value of treatment by the use of antitoxin. While almost all writers are in accord regarding the great value of the discovery of this measure in combating the disease, there are a few papers published each year regarding the fallacy of the statistics upon which favorable reports are based; while from conversations with practitioners I learn that quite a number are using the remedy because it is considered by most men as the proper method to adopt, or else are ignoring the vast amount of evidence in favor of the remedy because of individual failure with its use. In one case in particular I know that a physician of wide experience and good powers of observation, with ample opportunity for using them, is a thorough skeptic in regard to the value of the remedy. In his case I am sure that his doubt of its efficacy is due entirely to the fact that his first experience with it was in the case of patients who were first seen long after the onset—a circumstance that of itself renders fallacious any conclusions that might be drawn from his use of the remedy. Consequently in this case the faith in the remedy that is necessary to its proper use is lacking, and I very much doubt whether the doses used are such as would be employed by one who had more confidence in the results to be obtained. The same lack of boldness in using the antitoxin prevails among those who use it in a perfunctory manner.

The statistics that have already been presented speak for themselves, and should convince the most skeptical as to the value of the remedy; nevertheless, it is well that the collection of statistics upon the question should continue, not only in order to still further confirm the results previously obtained, but also because in a disease such as diphtheria, where notably each case differs from another, all questions regarding the influence of this form of treatment upon the disease in its different manifestations, and upon the various complications and sequelæ, may be estimated with the slightest possible chance of error.

While statistics are of value in this question, and are possibly more convincing and scientifically accurate than are personal observations and impressions, yet these latter have some value in estimating the results of a given form of treatment from our inability to accurately compare groups of cases of such widely different degrees of severity as are those of diphtheria. In the experience of those connected with the Children's Hospital of Philadelphia the value of antitoxin has been inestimable. While we have not had such difficulty with the disease as to require stringent measures, such as closing the institution or giving immunizing doses to all applicants for admission or at stated intervals to those already in the wards, as has had to be done at some institutions, we have had constantly recurring instances of the disease among both patients and nurses. Since the introduction of the use of antitoxin the disease has assumed an entirely different position as regards both danger of its results and the length of its course. Frequent inspection of the throat and nose of both patients and nurses and culture tests of all cases of angina or coryza have enabled us to detect the presence of the disease at the earliest possible period. This opportunity for early diagnosis and treatment permits of our judging somewhat clearly as to the value of any method of treatment. Before the introduction of antitoxin the development of diphtheria in a patient or an attendant was a grave and serious accident, and there was felt no confidence that any case might not develop into one of great severity or into one with a fatal ending. The same methods of detection were then available, and cases were treated as promptly as at the present time, yet there was no way in which the possible gravity of a case could be forestalled. At present our danger is possibly that of erring too much upon the side of belittling the gravity of the disease, so confident are all those in authority that in antitoxin we have a remedy that is capable in the early stages of stopping the progress of the disease almost at once. The nurses in the hospital are naturally those most exposed and most frequently infected. Upon the appearance of angina a culture is at once taken, even in the absence of all evidence of exudate. If no exudate is present, unless certain exposure has made the likelihood of the angina being diphtherial almost a certainty, the results of bacteriological examination are learned before the injection of antitoxin. If, however, there is the slightest exudate, or membrane, or gray infiltration, at least 2000 units of a reliable antitoxin are at once injected. If a positive report is received from the bacteriologist, 2000 units are at once injected, and the injections are repeated, if necessary, to cause the complete disappearance of all subjective symptoms and objective signs, after which isolation is enforced until the throat is free from bacilli. Since this plan has been adopted there has not been a case of diphtheria of any severity among the nurses, although exposure to the disease is very frequent. The *danger* in the use of antitoxin lies in our tendency to make light of the disease as regards the harmful effects upon the heart-muscle of even small doses of diphtheria toxin and the difficulty in making our patients avoid exertion for a sufficient length of time after apparent cure is effected.

It seems scarcely necessary to bring forward further statistics in support of the use of antitoxin, yet for the reasons given above a few of those published during the year are here presented.

Rachfuss[1] furnishes statistics upon a large number of cases of diphtheria treated with antitoxin, in a paper read before the Twelfth International Medical Congress. Of 44,631 cases treated with serum, 14.6 per cent. died ; at the same time 6507 cases were not treated with serum, and gave a mortality of 34.1 per cent. The tables given are strongly confirmatory of the necessity, already many times insisted upon, for treatment at the earliest possible moment. Among his cases the mortality increased progressively the longer the injection was delayed, so that while those injected on the first day showed a mortality of 3.7 per cent., those injected on the second day showed a mortality of 8.2 per cent., while of those injected on the third and fourth days 16.2 per cent. and 25.9 per cent. respectively died.

The report of the Clinical Society of London upon this subject is based upon a series of 633 consecutive and not selected cases. Of these 633 cases 124 (19.5 per cent.) were fatal, this mortality being reduced to 15.6 per cent., if cases dying within twenty-four hours be excluded. In contrast with these the committee found that among 448 unselected cases which were not treated with the antitoxin, 150, or 33.4 per cent., died. Contrasting the laryngeal cases in the two classes it was found that in the series wherein antitoxin was used the mortality was 26.6 per cent., whereas in the other group 66.6 per cent. died. Where tracheotomy was performed the mortality among those in whom serum was not used reached 71.6 per cent. as against 36 per cent. in those treated by antitoxin.

Camara[2] reports the use of diphtheria antitoxin in 345 cases. Of these 32 died (9.2 per cent.) ; of the 195 cases of angina 16 died (8.1 per cent.) ; in 149 croup cases 16 died (10.7 per cent.). Intubation was performed in 103 cases, of which 14 died, while of 9 in whom tracheotomy had been performed 2 succumbed. Of the 44 cases of angina and 31 with laryngeal involvement that were treated within twenty-four hours not one died. The 16 fatal laryngeal cases were all under four years of age. Of the cases where the pharynx was involved none died that were under two years of age. In the treatment of these cases Camara used Löffler's solution and 2000 units of serum, repeated on following days if general symptoms persisted. In laryngeal cases he injected 1000 units of serum every twelve or twenty-four hours, depending upon the severity of the case, until temperature and pulse fell to normal and the membrane was thrown off.

---

[1] Centralblatt für Bakteriologie, Parasitenk. und Infectionsk., February 10, 1899.

[2] Archivos de Medecina F. I., Heft 5 and 6; abstract in Centralblatt fur Bakteriologie, Parasitenk. und Infectionsk., January 25, 1899.

Post-diphtheritic Paralysis. The effect of the use of antitoxin upon the frequency of occurrence of paralysis after diphtheria should, theoretically, be the lessening of this sequel, because of the diminution of the severity and duration of the disease and the antidotal action of the remedy upon the toxin. In the report of the Clinical Society of London, above quoted, the occurrence of post-diphtherial paralysis in 29.9 per cent. of the cases in which antitoxin was used stands in unfavorable contrast with its occurrence in only 10.8 per cent. of the cases not treated by antitoxin. The explanation given in the report is probably correct—namely, that the mortality from paralysis in the cases where antitoxin was not used was 12.2 per cent., while in those treated with antitoxin it was only 8.2 per cent., and, therefore, a larger proportion recovered and showed paralysis as a sequel when antitoxin treatment was employed.

Woodhead[1] has collected 494 cases of post-diphtherial palsy, of which 155 were primary paralysis of the palate; 197 had strabismus, and in 10, other muscles were paralyzed. In 102 cases there was cardiac paralysis, 91 of which died. No case of palatal palsy occurred before the fourth day, most of them occurring between the fifth and fifteenth days. Oculomotor paralysis generally appeared at about the same time, whereas paralysis of other parts never showed itself earlier than the tenth day. One case of palatal palsy occurred as late as the sixty-fifth day; one of oculomotor palsy on the ninety-first day, and one of palsy of other parts on the fifty-first day.

Baginsky[2] believes that post-diphtherial paralyses are less common now than formerly. He attributes post-diphtherial hemiplegia to cerebral embolism in the majority of cases. In three cases under his observation this was the pathological lesion in all.

Hugo Kraus[3] has reported a curious case of post-diphtherial palsy of the upper and lower extremity without atrophy. There was slight tenderness over the radial and ulnar nerves and in the thighs and calves.

---

[1] British Medical Journal, September 3, 1898.

[2] Ibid.

[3] Jahrbuch für Kinderheilkunde, Band c., Heft 3.

A curious area of œdema was present on both arms—from the upper third of the arm to the wrist—giving the appearance of a uniform spindle-shaped enlargement. There was also some swelling of the face from œdema. There was no albuminuria, and the œdema is attributed to neuritic disturbance.

Heart Complications. The danger to the heart in diphtheria is certainly lessened by the use of antitoxin, partly, no doubt, from the shorter duration of the infection and its lessened intensity; partly, it may be, because the antitoxin may have a physiological as well as a chemical antidotal power. Nevertheless, the danger of persisting cardiac weakness, or even of degenerative changes in the cardiac muscle sufficient to cause irrecoverable dilatation and incompetence, cannot be insured by the use of antitoxin; and even though the attack be rendered mild and brief by its employment, the greatest circumspection must still be used in allowing exertion during convalescence.

Not only is there danger of cardiac weakness from the depressing effect of the poison upon the myocardium, but (probably in great part as a result of this action) there is grave danger of cardiac thrombosis and embolism.

Woollacott[1] reports three cases of cardiac thrombosis occurring in the course of diphtheria. These were the only instances of this condition in over 200 autopsies upon diphtheria patients. In one case the thrombosis was situated at the apex of the right ventricle; in another in the lower portion of the left ventricle; in the third in the auricular appendix. In all three cases the pulse was weak, rapid, and irregular; there was restlessness and præcordial and abdominal pain. The præcordial pain is attributed to distention and dilatation of the heart, and it usually became more marked nine or ten hours before death. This small percentage (1.5) of cardiac thrombosis found in fatal cases is somewhat surprising in view of the importance that is usually attached to this accident as a cause of death. In discussing these cases Woollacott states that in the 4000 treated in the Eastern Hospital, hemiplegia occurred in two, and in neither of these was any heart lesion present.

TYPHOID FEVER.

Diagnosis. The diagnosis of typhoid fever is often one of much difficulty, and every clinician frequently encounters cases wherein the existence of that disease is suspected, yet a positive diagnosis is not immediately possible. In every large hospital there are admitted cases presenting possibly none of the symptoms or signs of typhoid fever, yet with fever, hebetude, and the general feeling of illness common to this as well as to many other affections. The history of the case may give us some ground for more than mere suspicion, yet the early symptoms of typhoid fever are so variable in their occurrence and frequency that many a case presents neither severe headache, epistaxis, diarrhœa, nor other characteristic symptom. In hospital work a delay in making a positive diagnosis makes comparatively little difference to us; but in private practice confidence on the part of the patient, and perfect honesty with a candid explanation of the difficulties in diagnosis by the physician, are often necessary in order that the situation may not become strained.

---

[1] Lancet, May 6, 1899.

It was with satisfaction that Ehrlich's diazo reaction was received. Unfortunately, it is present in such a large number of diseases that except for a negative value it has not been of much assistance. Often it is absent early in the course of a case of typhoid fever at a time when a positive sign is most wished. A most exquisite positive color-test may be obtained in many cases of pulmonary tuberculosis and during the febrile period of malaria, while its frequent presence in measles is well known.

The frequency of positive diazo reaction in acute miliary tuberculosis is one of the greatest drawbacks to its usefulness, as it is this condition which it is most difficult to exclude. The presence of subpleural friction in acute miliary tuberculosis, if present, is a valuable sign, but it is not constant, and often fails as a means of deciding the diagnosis.

The agglutinative reaction of the blood-serum in typhoid fever was supposed to be a possible certain test. Unfortunately, while of great value when found early, negative results are frequently obtained until the disease has developed sufficiently to enable the diagnosis to be definitely made without the aid of the test. It has seemed to me that this is particularly apt to be the case in children, in whom the diagnosis is often one of considerable difficulty. This early absence of the sign detracts much from its value, but it is not intended to be implied that the reaction is not a decided gain to us. Its absence on one, two, or even more examinations should not cause us to too abruptly alter our diagnosis, especially at the beginning of the disease. It should, however, cause a fresh reconsideration of the possibilities of the case and the more certain exclusion of other diseases.

PIORKOWSKI'S TEST. A method of diagnosticating with safety the Eberth bacillus from the bacillus coli communis has been proposed by Piorkowski, and was the subject of a communication by him during the past year.[1] He takes advantage of the different manner of growth of the organisms upon a medium composed of urine and gelatin. The medium is prepared as follows: A normal urine having a specific gravity of 1020 and alkaline reaction is mixed with 0.5 per cent. of peptone and 3.3 per cent. of gelatin. This is kept in a water-bath for an hour and at once filtered. Test-tubes are filled with the mixture, closed with cotton, and sterilized in the autoclave at 100° C. for fifteen minutes. The sterilization is repeated on the following day for ten minutes. On this medium after twenty hours the bacterium coli grows in round, yellowish, finely granular, and sharply outlined colonies, while the typhoid bacillus produces colonies arranged in thread-like lines radiating from a centre. The culture-tubes must be kept constantly at a temperature of 22° C., as at a lower temperature the typhoid colonies do not show the characteristic growth.

---

[1] Berliner klinische Wochenschrift, February 13, 1899.

In the normal feces Piorkowski never obtained the peculiar arrangement seen in growths from typhoid stools. Only four patients were available for study, but in all of these the diagnosis could be established in twenty hours—in one case before the Widal reaction was obtained, and in another as early as the third day of fever. Since the above sentence was written Piorkowski has made a further report before the Verein für innere Medicin in Berlin,[1] in which he states that forty cases had been examined by this test up to November, 1899. In all the test was satisfactory. In some the characteristic growth was obtained from the third day of the disease up to the third day of apyrexia, while the Widal reaction was still absent or not positive. Similarly favorable reports were made by Schütze and Michaelis in discussing the paper, but Unger stated that he had found a characteristic growth according to this method in one case of non-typhoid angina. Further work is, therefore, necessary before absolutely accepting the conclusions of the discoverer of the culture-test. Its possible value is a sufficient stimulus to further research.

THE WIDAL REACTION. Cabot[2] has collected 5978 cases of typhoid fever, in which the Widal test was employed, reported by different observers, and finds that of these 5814 (97.2 per cent.) have given a positive reaction, while 164 (2.8 per cent.) gave a negative reaction. Out of 5668 cases of diseases other than typhoid fever a reaction was obtained in only 5 per cent. Of the cases with negative reaction 113 were tested upon one occasion—a fact that still further should reduce the percentage of negative results.

Cabot's *résumé* of the earliest date on which reaction was obtained by different observers is very interesting. Thus of 70 cases 9 showed reaction on the sixth day, 21 on the tenth day, 16 on the fifteenth day, 12 in the second to fourth week, 1 on the third day in bed, 7 on the seventh day in bed, and 4 on the fourteenth day in bed (Jackson's cases). In another table Cabot's own cases are tabulated. Of the 35 cases 2 showed the reaction either before or on the first day in bed, 3 on the second day, 1 on the third day, 5 on the fourth day, 2 on the fifth day, 1 on the sixth day, and 6 on the seventh day. In an examination of 18 cases in which the blood was examined within two weeks from the very first sign of illness a positive reaction was obtained on the fifth day in 1 case, on the seventh day in 2, on the eighth day in 1, and on the ninth day in 5. In 2 cases the reaction was obtained five days before the appearance of rose spots or of splenic enlargement. As Cabot says, the date of onset of typhoid fever is so variously estimated by patients that it is difficult to get absolute figures showing the day of disease on which examination was made. He concludes, however, that out of a total of 849 cases tested before the eighth day a positive reaction was obtained in 93 per cent. The late appearance of the Widal reaction must have been noticed by everyone who has to do with this disease. Cabot has investigated reported cases wherein the reaction was first obtained after many days, and has collected many in which it has failed until the thirtieth or even the thirty-sixth day, while absence in the original attack with its presence during relapse has been noted by him in three of his own cases, and others from the literature have been collected. In 19 of Cabot's 292 cases the reaction did not appear at all until after the second week in 2, and of these 19 cases 10 did not react until the relapse or until the temperature had reached the normal. In his summary, dealing with the length of time after typhoid at which the reaction may be present, he shows that 1 case has been reported with a positive result thirty-seven years after infection, another at thirty years, another at twenty-seven years, 2 at twenty six years, 1 at twenty-four years, etc.

---

[1] Vereins-Beilage für Deutsche medicinische Wochenschrift, November, 26, 1899.

[2] The Serum Diagnosis of Disease.

Kasel and Mann[1] have contributed a paper of much interest in connection with the time of appearance of agglutinative reaction in typhoid fever. In 2 cases out of 43 they found no reaction up to the thirty-seventh day. Five other cases gave negative tests on the seventh, eighth, tenth, sixteenth, and nineteenth days, and the positive reaction on the thirteenth, fourteenth, thirteenth, twenty-second, and twenty-sixth days respectively. The reaction may occur only after the temperature has reached the normal point. In one of their cases this occurred five days after the fall of temperature. This late appearance of the reaction gives greatest strength to the theory that it is a reaction of immunity rather than of infection. The authors cited also state that the strength of the reaction may increase rather than decrease after the fall of temperature. They tabulate 51 cases in order to show the retention of the reaction. During the disease 30 gave a positive, 19 a negative test. During the first year 20 were still positive and 11 were negative (one of these after thirty, another after forty days). After the lapse of a year 6 were negative, while 1 was negative after the second, 1 after four, and 1 after five years had elapsed since the attack. Four were negative after ten years, and 1 eighteen years after the attack. Eleven cases gave a positive result, as follows: One after the lapse of fourteen months, 1 fifteen and a half months, and 1 seventeen months, 3 three years, and 2 four and a half years. Two gave a positive result after four years and nine months, and 1 each after five, ten, fifteen, and twenty-one years. They found that the longer the time elapsing after the disease the weaker the reaction became, consequently a strong, quick reaction would point to its being due to a present and not to a former attack. In one of the cases coming under the observation of the authors the diagnosis was made from other clinical signs by the tenth day, while the reaction was negative until the twenty-second day. On another occasion the diagnosis was made on the sixth day, at which time the reaction was absent, and a positive agglutinative test was only obtained seven days later. Three cases are narrated of children whose mothers had had typhoid fever before the birth of the former. One of these maternal attacks had occurred but a short time before birth, in one fifteen years before, and in the third twenty years prior to the birth of the child. In the case of the woman who had had typhoid fever fifteen years before the birth of the child, her milk gave a positive reaction within fifteen minutes in a dilution of 1:50. In the woman who had recently recovered from typhoid the blood gave a reaction in a dilution of 1:50, while the milk gave it in a dilution of 1:12, and motility was regained after twelve hours.

---

[1] Münchener medicinische Wochenschrift, May 2, 1899.

The diagnosis of typhoid fever in children is one of much difficulty, and in its application to this class the test has been one of great value. Pfaundler[1] found the Widal reaction always present among the nineteen cases of typhoid fever in children that he examined for it. It appeared at the end of the first week, as a rule, the earliest time of appearance being the fifth day, although on one occasion it was first found in the second half of the third week and once not before the fourth week.

Morse and Thayer[2] have investigated the frequency of the occurrence of the Widal test in 50 babies under two years of age. These cases were grouped clinically as simple diarrhœa, 2; fermentative diarrhœa, 45; ileocolitis, 3. Among these 50 cases a positive reaction was obtained in one only, and in this patient there was nothing indicative of a present attack of typhoid fever, but its mother's blood showed a positive reaction and it is presumed by the writers of the paper that this latter fact was probably accountable for the positive result obtained with the child's blood. The authors' conclusions are that typhoid fever is an unusual disease in infancy, and that it is possible that women whose blood gives a positive Widal reaction, even though it be years after the occurrence of the disease, may in some way transmit this peculiarity to their infants.

---

[1] Jahrbuch für Kinderheilkunde, Band l., Heft 3.

[2] Boston Medical and Surgical Journal, January 12, 1899.

While it is undoubted that typhoid fever is not so frequent among children as it is among adults, it would be hardly right to attach too much importance to such a negative result as has been obtained by the writers of this paper. The report simply seems to show that in none of their cases was the diarrhœa due to infection by the bacillus of Eberth.

In connection with the subject of typhoid fever in infancy and childhood, I have asked Dr. Keogh, Resident Physician at the Children's Hospital, to tabulate for me the cases of that disease admitted during the last three years, with a statement as to the presence and time of appearance of the Widal reaction. The results can be seen in the following summary :

During 1897, 16 cases were admitted. The ages of the patients varied from nineteen months up to twelve years. There were 2 cases of the former age, 1 aged four years, 2 aged five years, the remainder being beyond that age. Widal's test was applied in 12 cases. In one case the reaction was absent when tried on the twenty-eighth and forty-ninth days of the disease, but whether it had been tried before those days cannot be determined from the notes. In 1 case the reaction was absent on the tenth, but present on the thirty-seventh day. In 3 cases a positive reaction was obtained on the seventh day, the patients being five, seven, and nine years of age ; in 1 patient, aged nine years, it was obtained on the eighth day. In the 2 cases aged nineteen months the reaction was positive on the fourteenth and seventeenth days, respectively, but might have been obtained earlier had the cases been under observation at a time nearer to the onset of the disease. None of these cases died.

In 1898 there were 38 cases admitted, of which only 1 had reached the age of two years. The agglutinating action was sought for in 35 cases, no record of its having been tried being found in three cases. The reaction failed in 1 case, aged eleven and a half years, on the fifth day of the disease, but whether again tried is not noted. In 1 case, aged three and a half years, the reaction was absent on the fourteenth, but present on the twenty-third day. In 1 patient, aged nine years, dying of intestinal hemorrhage and showing typical intestinal lesions, the reaction was absent on the seventh day (as nearly as could be determined from the history given), but the patient died before another specimen could be examined. One other case, a child, aged six years, gave a negative result on the eleventh and sixteenth days. Of the 38 cases 4 died, aged respectively fourteen months (from stenosis of the larynx), nine years, and twelve years.

During the past year 84 cases of typhoid fever were admitted. One child, aged nine months, gave a positive reaction on the seventh day; another, aged fifteen months, gave a positive reaction on the eleventh day. The reaction could not be obtained in 1 case, aged thirteen years, whose blood was examined on the fifth, ninth, sixteenth, and thirty-second days; in another, aged three and a half years, on neither the tenth nor the sixteenth days; in a third, aged four years, on the fourth or nineteenth days; in a fourth (clinically doubtful) on the sixth day; in a fifth, aged four years, on the fifth day; in a sixth, aged eleven years, on the twelfth day; in a seventh, aged four and a half years, on the fifth day; in an eighth, aged eight years (dying of diphtheria), on the sixteenth day. In 1 case, aged eleven years, the reaction was absent on the fifth, but present on the seventh day; in 1, aged five years, it was absent on the seventh but present on the tenth day; in 1, aged ten years, it was absent on the eleventh and fourteenth days but found on the twentieth day; in 1, aged eleven years, it was absent on the ninth day but present on the twenty-second and twenty-fourth days; while in a patient aged eight years it was consistently absent when sought for on the sixth, eighth, fourteenth, and nineteenth days, while on the twenty-second day two specimens were examined, one of which gave clumping; the other did not. Of the 84 cases 10 died, 2 from intercurrent diphtheria.

In the past three years, therefore, the total number of cases admitted was 138, of which 14 died, giving a mortality of 10.1 per cent., or, excluding the cases dying of diphtheria, 8.6 per cent.

The Widal reaction gave no help in the diagnosis in twelve cases, although in many of these the test was noted as being tried on only one occasion, and the absence of the reaction, therefore, is not significant. In only five cases was the reaction absent when more than one examination was made, and among these the test was tried only twice in three cases, leaving a margin of error, among those tested more than twice, of only 1.45 per cent. Unfortunately, it cannot be said positively that the agglutinating power of the blood may not have been transmitted to the younger children from the mother, as was supposed by Morse and Thayer to be the reason for its presence in the case having a positive reaction among their patients.

The question of the *transmission of the agglutinating power of the blood of the mother to the fœtus* through the placenta is one of much interest, not only theoretically, but also because of its bearing upon the significance of a positive reaction in the blood of infants supposed to be suffering from typhoid fever in case the mother has had typhoid fever or in case definite knowledge as to this fact is unobtainable. All communications bearing upon this question have, therefore, a distinct value. A. Mossé and H. Fraenkel[1] have reported an observation upon the blood of the placenta and heart of a six-months' fœtus obtained from a woman who miscarried during convalescence from an attack of typhoid fever. The placenta was normal when examined histologically. The blood from the heart of the fœtus possessed agglutinating power, but to a decidedly less degree than did the blood from the finger of the mother and blood from the placenta. Their conclusions upon the questions are: 1. The agglutinating property can pass from the mother to the fœtus through the unaltered placenta. 2. This property may not be found in the new-born at term, the mother having had typhoid fever during gestation. 3. The power is more feeble in the child than in the mother, progressively lessens after birth, and *appears* to be a borrowed property resulting from the filtration of the agglutinating material through the placenta. 4. The energy of the maternal agglutinating power, and especially the length of time during which the agglutinating or agglutinogenous materials carried by the maternal blood impregnate the placenta, are important conditions of transmission of agglutinating power from the mother to the infant. 5. The agglutinating power of milk or colostrum, ordinarily inferior to that of the blood, can in certain circumstances reach a high degree (1:500).

In the discussion upon this paper Achard related the case of a woman who went through an attack of typhoid fever and was delivered at term. The blood of the child showed a high agglutinating power (1:200). (It is not difficult to understand why, theoretically, the blood of the infant might have a less intense agglutinating power than that of the mother when we consider that while the mother contributes some of the materials going to form the child's blood, other portions are being constructed by the child itself, and are, therefore, derived from tissues probably not so deeply involved in the typhoidal intoxication as are those of the bacillus-infected mother.)

Typhoid Fever without Intestinal Lesions. In one other respect besides the confirmation of the diagnosis made by other clinical methods, the Widal test is of decided value. Typhoid fever is not a disease of the bowel, nor at the outset is it a systemic disease. It is an infection caused by the entrance of a specific micro-organism into the tissues of the body. The usual portal of entry is by way of the intestines, from the lesions of which toxins are absorbed and the bacillus itself gains access to other organs. As with other micro-organisms, so with this bacillus, the invasion may occur without evidence of its entrance at the point by which it usually gains access. In other words, we may have typhoid fever without intestinal lesions. Cases of this kind have been appearing in the literature for the past few years.

---

[1] Bulletin et Mémoires de la Société Médicale des Hôpitaux, January 19, 1899.

During the past year cases have been reported by Lautigan,[1] McPhedran,[2] Bryant,[3] and Hodenpyl.[4] Lautigan's case, a man, aged thirty-six years, was taken ill four days before admission, and had the usual symptoms of typhoid fever, with some vomiting, constipation, and delirium toward the end of his illness. At autopsy the spleen was found to be enlarged, and the liver, whose cells had undergone cloudy swelling, was also enlarged. The intestines showed a perfectly normal mucous membrane, without involvement of Peyer's patches or of the solitary glands. The retroperitoneal glands were enlarged. Sections of the liver, spleen, kidney, and mesenteric glands showed on section bacilli resembling typhoid bacilli, while in cultures from the heart-blood, lung, liver, gall-bladder, and spleen the typhoid bacillus was present in pure culture. McPhedran's case had the clinical symptoms of typhoid fever, and gave a positive Widal reaction. The patient died on the twenty-first day after his admission to the hospital, and at autopsy there was found complete absence of the ordinary lesions in the intestine, but typhoid bacilli were cultivated from the spleen. Twenty similar cases from the literature are analyzed.

Bryant[5] has noticed fifteen cases from the literature in connection with the case of a child, twenty-one months old, who died with symptoms of typhoid fever complicated by pneumonia. Widal reaction was positive. Diarrhœa was a prominent symptom, yet at autopsy there were found no intestinal lesions and no signs of healed ulceration. The mesenteric glands, on the contrary, were enlarged and acutely inflamed, while cultures from these glands showed the presence of the bacillus typhosus.

In Hodenpyl's case there was no change in the intestines or in the lymphatic apparatus. The spleen, however, was slightly enlarged, and showed on culture the presence of the typhoid bacillus. The case had run the clinical course typical of typhoid fever, although no reference is made to the presence or absence of the Widal or diazo reaction.

Symptomatology. While the prodromal symptoms of typhoid fever as a rule are malaise, headache, anorexia, diarrhœa, and epistaxis, cases are frequently seen where none of these symptoms are present, but where there is complete absence of definite symptoms until the patients become seriously ill. Within the past few years several papers have appeared illustrating the sudden onset of symptoms in typhoid fever, and just as we fail to see the step-like ascent of temperature described by Wunderlich as present in the first week of the disease, so we may see the sudden onset of severe symptoms. The most striking instance of this that has ever come under my own observation was in the case of a man admitted to the Methodist Episcopal Hospital during my term of service in the spring of 1892. This patient was admitted to the surgical ward under the care of Dr. Wharton, because of a dislocation of the femur produced by his trying to stop a moving railroad car by pressing his foot against the buffer. As this act would indicate, he was feeling well until shortly before his admission to the hospital. On admission he was found to be a strong, well-nourished man, and showed nothing unusual except the results of his injuries, and made no complaint of previous ill health. On the day after admission, without apparent cause and after a period of some twelve hours of normal temperature since his admission to the hospital, his temperature suddenly went up to 104° F. Careful examination revealed no cause for this elevation of temperature which steadily continued with the later development of enlargement of the spleen, roseola, and other typical evidences of typhoid fever, from which he ultimately died. The case is detailed in this connection because, owing to his injury, the man was under careful observation and his temperature was known to have been normal for at least a day before his attack. In this case, therefore, the typhoid fever began with a sudden rise of temperature without prodromal symptoms. Sore-throat is a frequent prodromal symptom, and in some cases is the only symptom of which the patient complains, while in one patient under my care last winter stiff-neck was the only symptom complained of until a typical typhoid eruption had been present for some days. The case later ran a characteristic course.

---

[1] Johns Hopkins Hospital Bulletin, April, 1899.

[2] Canadian Journal of Medicine and Surgery, October, 1899.

[3] British Medical Journal, April 1, 1899.

[4] Studies from the Department of Pathology, College of Physicians and Surgeons, Columbia University, New York.

[5] British Medical Journal, April 1, 1899.

The temperature during the course of the attack may show wonderful variety, although in the charts at the present time, when the Brand method causes such artificial variations in the temperature-curves, cases often do not exhibit these variations as well as do those where the regular Brand treatment is not employed. In a case observed last winter in a trained nurse, who so strongly objected to the baths that they could not be employed, the temperature, which had previously been running a mild and uniform course, suddenly dropped to 97.6° F. on the evening of the ninth day of the disease, soon rising to its former height of 103° F. Free sweating occurred and the temperature fell to 95° F., and for eighteen hours remained persistently below 96° F., although there was no complication or other explanation for this remarkable persistence of low temperature. At the end of twenty-four hours of low temperature a sudden rise to 105.4° F. occurred, after which the temperature gradually fell to normal, as does a case presenting throughout the ordinary typhoid temperature-curve. In spite of the presence of the Widal reaction in the absence of a former attack of the disease, and in spite of the presence of the diazo reaction, implicit confidence in the diagnosis of typhoid fever was for a time shaken. In repeated examinations of the blood the plasmodium was found to be absent, and it was feared that the case might be one of acute miliary tuberculosis simulating typhoid fever. After running an otherwise normal course the patient recovered, bilateral femoral thrombosis occurring in both legs, and the Widal reaction persisting until the patient passed from under my observation.

Occasionally the temperature pursues a course resembling that of pneumonia more than that of typhoid fever. The most marked case of this kind that I have ever seen was that of a colored woman in the Pennsylvania Hospital during January, 1896. She was admitted on the fifth day of the disease, and for the first four days after her admission, with poorly developed symptoms of typhoid fever, the patient's temperature was constantly between 103° and 104° F. in spite of sponging, which was the only hydropathic measure employed because of the belief that she was suffering from central pneumonia and not from typhoid fever. The temperature never varied more than one degree during the first eleven days of her illness; it then stayed persistently between 104° and 105° F. for three days. On the seventeenth day hemorrhage from the bowel occurred, causing a drop of a degree and four-fifths, and from this time the temperature gradually fell by steps until it reached the normal point on the twenty-eighth day of the disease. For ten days, therefore, the patient had an almost uniform line as a representation of the height of her temperature.

ANOMALOUS RASHES are frequently present in typhoid fever, while the absence of rose spots cannot have serious weight in eliminating the diagnosis of this disease. A recent addition to this subject has been made by J. M. Da Costa,[1] who has reported nine cases of anomalous eruptions in typhoid fever. In one or two the rash resembled that of typhus, in one that of scarlatina, in one that of measles.

TYPHOID BACILLI IN THE ROSEOLA. Neufeld[2] has examined the roseola in typhoid fever for the presence of Eberth's bacillus. In only one out of ten cases examined did he fail to find the bacilli, and in that case only three spots appeared; the typhoid bacilli were never found in the stools, nor was Widal's reaction positive. In the other nine cases the bacilli were found on the first examination in eight. Neufeld used as his culture medium bouillon or fluid agar, and took blood from many spots at the same time, for the reason that the bacilli are in small number in each spot, and also because the bacilli seem to disappear from the spots long before their color fades.

---

[1] American Journal of the Medical Sciences, 1899.

[2] Zeitschrift für Hygiene und Infectionsk., 1899, Band xxx., Heft 3.

Typhoid and Malaria. The subject of the simultaneous existence of typhoid fever and malarial infection has excited a considerable amount of interest for a long time. Great uncertainty necessarily existed in regard to the presence of these two infections in combination until the discovery by Laveran of the cause of malaria and the utilization of this discovery in clinical diagnosis. Many articles have been written recently upon this subject, one of the best being by J. P. Lyon,[1] in which the author reports a case of this combination, and has collected from the literature twenty-nine similar observations. Only those cases were included in which the plasmodium of malaria was found in the blood and in which the existence of typhoid fever was confirmed by the symptomatology and by pathological and bacteriological examinations. His own case had had attacks of malarial fever in June, August, and October, for which the patient was treated with quinine, though not very thoroughly. In January typhoid fever developed and ran a typical course. During convalescence chills and fever appeared, and the plasmodium was found in the blood.

In an article in the *New York Medical Journal* for February 25, 1899, Dock gives a further communication upon so-called "typho-malarial" fever. After dwelling upon the impropriety of judging that malaria is present from the presence of periodicity or the appearance of chills, as well as other symptoms which have been frequently looked upon as proving the presence of malarial fever, the author concludes his considerations of this portion of the subject with the following statement: "We find that the belief in the characteristic disease composed of typhoid and malarial elements is not based upon sufficient evidence; also the idea that the two diseases named are frequently associated remains to be proved." Another class considered by the author—adynamic malarial fever—is illustrated in his paper by a patient observed among the volunteers who contracted his disease during the presence of his regiment in Santiago. Dock concludes that the uncomplicated malarial fever resembling typhoid, lasting more than a few days and uninfluenced by quinine properly given, is rare. One statement is particularly striking, and its truth cannot be gainsaid. It is as follows: "In general it may be accepted as a fact that out of the large number of cases of fever called by names not used in ordinary text-books the majority will prove to be typhoid fever."

---

[1] American Journal of the Medical Sciences, January, 1899.

The question of the coexistence of malarial and typhoid fever has been fully discussed also by Ewing, a summary of whose article appears under the head of Malaria.

SUDORAL TYPHOID. Jaccoud[1] has reported another instance of a form of typhoid fever described by him in 1878 and called "sudoral typhoid." The present case concerned a patient, aged twenty-six years, who entered the hospital on the fourth day of his illness. This had begun suddenly with diarrhœa and generalized bronchitis. Large, reddish spots were present on the upper portion of the trunk and on the sides of the neck, with intervening small, red papules. Pearly sweat-drops were present all over the body. The temperature had fallen, but in spite of this the general condition became worse. Jaccoud's general description of this form of typhoid fever includes the following characteristics: The onset is usually abrupt and accompanied by a chill, usually with high temperature and profuse sweating. The temperature falls to normal, but no relief is experienced, the headache being very violent and lasting up to the eighth day. The sweating is apt to return on the second day, possibly at the same hour, and is accompanied by considerable prostration. There may be an intermission of fever for four or five days, which is then replaced by remittent fever, with from two to five exacerbations occurring every twenty-four hours, each rise being accompanied by sweating. Constipation is the rule. The cases are apt to be prolonged in their course. There is no evidence in this case of examination of the blood for the possible presence of organisms. As it occurred in a neighborhood where public work was in progress, it would seem that malaria should have been eliminated with certainty, either as the only causative factor of the trouble or as explaining the symptoms through a combination of malaria with typhoid fever.

Typhoid Bacilli in the Urine. An interesting and important paper has been published by Mark W. Richardson[2] in regard to the presence of typhoid bacilli in the urine. Positive results were obtained in twenty-three out of one hundred cases examined. The bacilli were found in some cases to be so numerous as to render the urine cloudy, and it was also found that they may persist in the urine for weeks, months, or even years after convalescence. The virulence of the organism was found in one case to be equal to that of cultures from the stools and from the internal organs. The importance of this work cannot be overestimated. The subject was also discussed in PROGRESSIVE MEDICINE, Vol. IV., 1899.

The same subject has been investigated by Gwyn.[3] Seven cases formed the basis of the report. One of these was a case of chronic cystitis of four years' duration, the onset of the trouble following shortly after an attack of typhoid fever. Pure cultures of typhoid bacilli were obtained from the urine. The second case had acute cystitis developing at the end of a relapse six weeks from the onset of his illness. Typhoid bacilli in large numbers and in pure culture were found in the urine. Pyuria disappeared on the use of irrigations with corrosive sublimate (1: 50,000), and three months later the urine was free from bacilli. In his third case the Widal reaction was absent, but examination of the urine, which contained pus, showed the presence of great numbers of typhoid bacilli. Another case of pyuria, in the fifth week of the illness, showed numerous typhoid bacilli in fresh urine. His fifth case was one of cystitis three months after typhoid fever, in which typhoid bacilli were found in the urine. In his sixth case nephritis and cystitis occurred in the third week of typhoid fever. On examination of the urine, which was turbid from the presence of typhoid bacilli, it was calculated that these organisms were present to the number of 500,000,000 to the cubic centimetre. Urotropin in doses of ten grains three times a day caused disappearance of the bacilli from the urine, although they could be cultivated from it. After five days of treatment the nephritis and cystitis improved and no bacilli were found. In this case and in the succeeding one a reappearance of the bacilli took place on one occasion during the administration of urotropin, to again ultimately disappear. In the eighth case, one of typhoid septicæmia with uncertain Widal reaction, the urine was found to be clouded by the presence of typhoid bacilli, which were diminished in number by doses of urotropin, ten grains, three times a day, although the patient died before a thorough test of its effectiveness could be made. In view of the fact that the Widal reaction may be long delayed or feeble, Gwyn suggests the bacteriological examination of the urine as a help to diagnosis. His conclusions upon the subject are: 1. Typhoid bacilli may be present in urine in from 20 to 30 per cent. of all cases of typhoid. 2. When present they can often be found in fresh urine by cover-slip examination. 3. Appearing in the second or third week of the disease the germs may exist in the urine for years. 4. Their presence has no prognostic significance. 5. Irrigation of the bladder with corrosive sublimate and the internal use of urotropin seem safe measures for the accomplishment of their removal.

---

[1] Journal de Médecine et de Chirurgie Pratique, March 10, 1899.

[2] Journal of Massachusetts Association of Boards of Health, July, 1899.

[3] Johns Hopkins Hospital Bulletin, June, 1899.

In connection with the subject of the presence in the urine of typhoid bacilli, the paper of P. Horton-Smith in relation to the respective parts taken by the urine and feces in the dissemination of typhoid fever is important. He has found that the feces contain bacilli in fair quantity up to the beginning of the third week, and that after that time they diminish and soon disappear; that the relapse may be preceded by a reappearance of the typhoid bacilli in the stools, but that during the greater part of the relapse and during convalescence they are not found. Typhoid bacilli are said to occur in the urine in 25 per cent. of the cases. Probably 5 per cent. of the cases show turbidity. The bacilli rarely occur in the urine before the third week or during convalescence, and they are generally present for some weeks or months. Horton-Smith concludes, therefore, that the stools are most dangerous within the first three weeks of the disease, while the urine becomes more capable of spreading the infection during the end of the attack. With Richardson, he has found that urotropin, in doses of 10 grains three times a day, causes a rapid disappearance of bacilli from the urine.

Typhoid Bacilli in the Gall-bladder. Within recent years much work has been done in regard to the presence of typhoid bacilli within the gall-bladder, their influence in the future production of stone within that viscus, and their ability to start up acute cholecystitis. During the past year many articles have appeared bearing upon this question. Camac[1] has collected from the literature forty cases of cholecystitis in typhoid fever, thirty-four of which showed the presence of typhoid bacilli. He reports an additional case in a young colored woman who had been ill for three weeks with typhoid fever. On the fourth day after her admission to the hospital the conjunctiva became yellow, and a mass was felt in the abdomen in the region of the gall-bladder. By aspiration 15 cm. of fluid were obtained. On the next day operation was performed, and the distended gall-bladder was opened and drained. The patient died early on the following morning. In the bile obtained on aspiration and at the time of operation typical typhoid bacilli were obtained. On autopsy the lesions of typhoid fever were found to be present, and cultures from the peritoneal fluid also gave typhoid bacilli.

Anderson[2] reports the history of a woman admitted with clinical symptoms of typhoid fever, frequent intestinal hemorrhages, and the physical signs of pneumonia. The woman's illness had lasted for three weeks. Ten days after her admission severe pain in the upper portion of the abdomen was felt, and there was tenderness over the liver and spleen. The patient sank rapidly, and died in three days. The gall-bladder showed numerous ulcers of varying depth, and over one, near the end of the viscus, there were some slight peritoneal adhesions. Near the origin of the cystic duct one of the ulcers had perforated and led into a small, localized peritoneal abscess. Except for the pain mentioned above there seems to have been nothing in the case to turn attention to the gall-bladder, and there seemed to have been no evidence of a perforative peritonitis. An explanation of this apparent absence of symptoms has been furnished by Maurice Richardson within the past few years.

---

[1] American Journal of the Medical Sciences, March, 1899.

[2] Lancet, April 22, 1899.

In striking contrast to this case is one reported by Imhofer[1] in a patient, forty years old, who lifted a sack of potatoes twenty-five days after typhoid fever, and immediately felt some pain in the right side of the abdomen. Five days later laparotomy was performed, and thin pus was found in the abdomen; the gall-bladder, enlarged to the size of a man's head, was covered with fibrin and was adherent to neighboring structures. The gall-bladder contained thick pus, in which typhoid bacilli were found in pure culture. No bacteria were found in the peritoneal exudate.

Ryska[2] reports from v. Jaksch's clinic three cases of inflammation of the bile-passages in the course of typhoid fever. In the first case the symptoms relating to the gall-bladder appeared eleven days after the onset; in the second case, on the twenty-eighth day of the disease; in the third case, on the forty-first day. Icterus was present in one of the cases, absent in the other two. One of the cases had frequent recurrence of jaundice, with tenderness over the gall-bladder; in another, without jaundice, there was frequent repetition of tenderness over the gall-bladder and right lobe of the liver.

Mixter[3] has reported the case of a woman, aged sixty years, who, after recovering from an attack of typhoid fever and remaining practically well for thirty-nine days, had pain in the epigastrium with vomiting, followed the next day by jaundice. Upon operation the gall-bladder was found filled with turbid bile and contained about thirty gallstones. Cultures taken from the gall-bladder at the time of operation gave a pure culture of typhoid bacilli.

Da Costa[4] has reported three additional cases of cholecystitis occurring in the course of typhoid fever and ending in recovery. In one of these there was pain in the region of the gall-bladder and tenderness on pressure, but there was no tumor. Of course, the possibility that this was an example of cholangitis rather than cholecystitis cannot be excluded. In his second case there was soreness in the region of the gall-bladder, with a distinctly localized tumor. In this case there was no jaundice of the skin or conjunctiva, but bile-pigment was present in the urine. In the third case, during convalescence, there was a sudden rise of temperature, pain in the abdomen with vomiting, and tenderness over the region of the gall-bladder, while a tumor in that situation, visible and palpable, explained the onset of the acute symptoms. Later in the course of the case jaundice appeared, although at first it seems to have been absent.

---

[1] Prag. medicinische Wochenschrift, 1898, Nos. 15 and 16.

[2] Münchener medicinische Wochenschrift, June 6, 1899.

[3] Boston Medical and Surgical Journal, May 25, 1899.

[4] Transactions of Association of American Physicians, 1899.

Cushing[1] has reported that in 1091 routine examinations of the bile of patients dying of typhoid fever at the Johns Hopkins Hospital 50 per cent. have shown the presence of the bacillus typhosus, while Miller, in the same journal, has recorded a case wherein the bile showed the presence of the bacillus typhosus seven years after the occurrence of typhoid fever.

Robert T. Morris[2] has reported a case of apparently primary cholecystitis with empyema of the gall-bladder, upon which operation was performed, with the result of removing from the gall-bladder thin greenish mucus and thick, tenacious yellow pus. No bacteriological examination of the pus was made, but a few days after the operation symptoms of typhoid fever appeared, this disease running a typical course and ending in recovery in about four weeks.

Within recent years the possibility of this retention of the bacillus of Eberth in the gall-bladder having something to do with the occurrence of relapses has been prominently mentioned. It is impossible to deny such a connection, but it is difficult to see in what way the relapse can be explained through this means, as the re-infection of the intestinal mucous membrane and Peyer's patches might reasonably be supposed to more frequently occur after a longer interval free from fever than is the case with the ordinary typhoid relapse. It has always seemed to me that we may pay too little attention to the mesenteric glands as a possible source of re-infection. The experiments of Manfredi, spoken of at the beginning of the article upon the infections, are of interest in this connection. Of course, a relighting of the activity of the bacilli in the mesenteric glands would not account for the occurrence of fresh intestinal ulcers. It is possible that the lymphadenoid tissue of the intestinal tract may retain bacilli in an inactive or attenuated state for a time, and then, through impairment of their attenuating power, allow the bacillus to redevelop and cause the occurrence of fresh ulceration. In spite of the numerous articles within recent years, we must confess that we do not as yet know the cause of the relapse in typhoid fever.

The Action of the Bacillus of Typhoid on the Nervous System. The typhoid bacillus can locate itself in and produce disturbance of most of the organs of the body. Among these peculiar localizations the one that produces the most puzzling results is that upon the central nervous system.

The subject of *meningo-typhus* has been carefully treated within the past year by Adam Loeb,[1] *apropos* of a case observed in Erb's clinic. The patient had been ill for a week with mental derangement, sore-throat, drowsiness, and headache. On examination it was found that the tongue was coated, the tonsils slightly swollen, the spleen enlarged and the liver palpable. Examination of the eye-grounds showed papillitis with venous engorgement in the right eye. No other sign of meningitis was present. Besides some excitation of the deep reflexes the nervous system gave no positively abnormal sign. Within the next few days the patient's soporous condition deepened into unconsciousness and tache cérébrale developed, but there was no evidence of the involvement of the cranial nerves except for a slight difference in the size of the pupils. The spleen meanwhile had grown smaller. Widal's reaction was negative on the tenth day of the illness. Lumbar puncture performed on the eleventh day was fruitless. The nervous symptoms gradually subsided, although papillitis later developed in the left eye and persisted. On the twentieth day of the disease a positive agglutinative reaction was found, and again between that and the twenty-sixth day. The papillitis gradually disappeared and the patient recovered, although slight inequality of the pupils and splenic enlargement were present two months after the onset of the disease.

---

[1] Johns Hopkins Hospital Bulletin, May, 1898.

[2] New York Medical Journal, January 28, 1899.

In this case bacteriological examination of the urine for the presence of Eberth's bacillus might have made the diagnosis plain before the presence of the Widal reaction. As Loeb says, the absence of the Widal reaction in the earlier course of the case and its presence later enhance its value as positive proof of the nature of what otherwise would have been a difficult condition to explain. While papillitis in typhoid is a rare lesion, Loeb refers to a number of such cases recorded in medical literature.

A case of *serous meningitis complicating typhoid fever* has been reported during this year by Boden[2] in a patient, fourteen years of age, who had been sick for two or three days. On admission the boy was stuporous and unable to stand, and had hyperæsthesia of the whole body, cyanosis, and continued high temperature. Two days after his admission he had an epileptic attack, after which his stupor increased. The sixth and seventh nerves on the left side became paralyzed, pupillary reaction was lost, and the knee-jerks absent. Death occurred five days after his admission, on the supposed ninth day of the disease. At autopsy there were found the lesions of a recent typhoid fever together with serous meningitis, accompanied by a large amount of clear, slightly turbid fluid in the meningeal spaces, with dilatation of the ventricles of the brain. From the serum Boden got a pure culture of Eberth's bacillus. Five previously reported cases are referred to in the paper.

---

[1] Deutsche Archiv für klinische Medecin, Band lxxii. p. 211.

[2] Münchener medicinische Wochenschrift, February 28, 1899.

W. W. Kerr and Herbert Moffit[1] report a case resembling that last spoken of in a man, aged twenty-eight years, who was admitted in stupor, coming on in the course of an illness which had already existed for three or four weeks. On his admission he seemed demented, answered slowly, and articulated poorly, but there was no true aphasia. The pupils were equal; there was no trouble with the ocular muscles; knee-jerks were present and equal. The Widal reaction was absent on admission, but was present one week before his death, about three weeks after admission. At autopsy there were found healed ulcers in the lower ileum and enlargement of the spleen. Covering the brain there was a thick, purulent exudate of a yellowish-red color, and cultures from the brain showed the presence of typhoid bacilli. In sixteen other cases found in the literature the typhoid bacillus was found on microscopical examination and in twelve in pure culture.

The subject of *generalized paralysis occurring in the course of typhoid fever* is one to which but little attention has been paid. The scarcity of reports upon this condition make an article by G. Etienne[2] of peculiar value. Three cases of this kind form the basis of the paper.

One of Etienne's cases was that of a man, aged forty years, who developed painless paralysis of the lower extremities on the third or fourth day of his convalescence from a severe attack of typhoid fever. On the next day the upper extremities and trunk became paralyzed and the urine and feces were passed involuntarily. Consciousness was fully preserved, but no movement was possible. Death in asphyxia occurred some days later. The case, therefore, resembled the acute ascending paralysis of Landry. Unfortunately, there was no examination of the spinal cord or of the nerves.

The second case showed some points of marked contrast to the first, in that severe, lancinating pains were present. The patient was suddenly seized with pains, first in the lower, then in the upper extremities, and finally in the trunk, on the fifteenth day of a typical attack of typhoid fever. These pains later diminished, only to return again and again with increasing frequency. When convalescence occurred the patient was found to be completely paralyzed, with extreme muscular atrophy. The reflexes were abolished, the electrical reactions were normal, and the sphincters were intact. In spite of this, progressive improvement occurred and ultimate cure resulted. Etienne looks upon this case as an instance of multiple neuritis.

In the fourth case, one of mild type, there occurred during its course paralysis in the great toes, and in a few days paralysis became complete, involving the upper extremities and the trunk; it was accompanied by difficulty in phonation and swallowing and by severe crises of dyspnœa. The reflexes were abolished; there was retention of urine and feces. Sensation was not affected. Ten days later muscular atrophy was observed, which rapidly became extreme, with great muscular hyperæsthesia. After the lapse of a month some motor power in the hand and forearm and in the great toes could be observed, but otherwise muscular palsy and atrophy persisted in spite of treatment.

---

[1] Journal of American Medical Association, March 18, 1899.

[2] Revue Neurologique, February 15, 1899.

Etienne believes the first case to have been an instance of acute anterior poliomyelitis; his second one of multiple neuritis, while his third was one of poliomyelitis plus multiple neuritis, the latter disappearing while the results of the disease of the anterior horns remained.

J. W. Moore has reported an instance of hemiplegia occurring in the course of typhoid fever on the thirty-eighth day of the disease. There was complete right hemiplegia with aphasia. The patient died on the forty-third day, and besides the lesions of typhoid fever there were found several hemorrhagic infarcts in the spleen, and the left middle cerebral artery was blocked by a firm clot. Paralysis of the posterior crico-arytenoid muscles has been observed by MacCoy in three cases reported at a meeting of the Section on Otology and Laryngology at the College of Physicians of Philadelphia. The first case was a young man who had been ill for two months, when he was suddenly seized with an attack resembling croup. Complete paralysis was present, and immediate relief was obtained by introducing an intubation-tube. In the second case tracheotomy was performed, while in the third case intubation was refused and the case terminated fatally. It is a question whether these cases of palsy are to be looked upon as due to a neuritis, to the degeneration of the muscle fibres, or to destructive changes produced by ulceration. Typhoid ulceration of the larynx is, of course, a not extremely rare accident in typhoid fever. It is of interest in this connection to note that Schültze found typhoid bacilli in the laryngeal surface of the epiglottis in typhoid fever.

In a consideration of the *ocular complications of the infectious fevers*, Percy Flemming[1] says that paralysis of the muscles of the eye occurs very rarely; that optic atrophy occurs occasionally, either from extension of inflammation or from a retro-ocular neuritis caused by a toxin, and that thrombosis or embolism of the central artery of the retina may occur.

De Schweinitz[2] has reported a case of oculomotor palsy, without involvement of the ciliary muscle during the relapse, in an attack of typhoid fever. Four months after the attack ptosis had disappeared, but there was limitation of movement in the upward, downward, and inward rotators. De Schweinitz looked upon the lesion as being due either to meningitis or to neuritis.

---

[1] British Medical Journal, April 29, 1899.

[2] Journal of Nervous and Mental Disease, June, 1899.

Changes in the nervous system produced by typhoid infection is the subject of a paper by Nichols.[1] The paper deals partly with human typhoid fever, of which three cases were studied, and partly with animals killed or dying after infection with typhoid bacilli. The examination was made by means of Nissl's staining method. The first case presented typhoid symptoms during life and at autopsy showed ulcers in the intestines, gall-bladder, œsophagus, and larynx. Pure cultures of bacillus typhosus were obtained from the liver, spleen, mesenteric and retroperitoneal glands, and from the urinary and gall-bladders. In the spinal cord numerous altered nerve-cells were found, the changes being most marked in the lumbar region. These changes consisted in increase in the size of the cell and of the dendrites, and partial or complete solution of the chromatin advancing from the nucleus toward the periphery. The nucleus in the more advanced stage of the chromatolysis was considerably enlarged, as was the nucleolus also. The second case was that of a woman who had died of typhoid fever, with intestinal perforation and peritonitis. Typhoid bacilli were cultivated from the bile, spleen, mesenteric glands, and kidney, and bacillus coli from the lung, peritoneum, spleen, and liver. In the spinal cord changes similar to those in the first case were present. The third case showed at autopsy a recent thrombus in the branch of the pulmonary artery supplying the lower lobe of the right lung, with consolidation and gangrene of the portion supplied. No intestinal lesion was found, but typhoid bacilli were grown from the consolidated area of the lung and, among other organs, from the spleen. The cervical cord could alone be examined, and showed changes similar to those present in the first two cases. The dorsal root ganglia showed alterations of a definite character in only a few cells. In experiments on seven rabbits killed or dying at periods varying from two hours to thirty-four days after inoculation, changes were found similar to those in the three human cases examined. In the sciatic nerves of the animals degenerative changes were present in the shape of varicose, swollen fibres and in breaking up of the neurokeratin and myelin sheath. Numerous small lymphoid cells were present, and the axis-cylinders were swollen, twisted, and no longer clear and homogeneous. Nichols' conclusions are: That in typhoid fever the motor cells of the spinal cord and the nerve-cells of the dorsal root-ganglia regularly suffer pathological change in the course of the infection; that the alteration in the motor cells is more constant and intense than that in the cells of the sensory ganglia. The most characteristic change consists in the disintegration, solution, and destruction of the chromatin of the cell, starting from the axone hillock and proceeding toward the nucleus. Coincidently with this process the nuclei of the affected cells seek the periphery. Alterations are also present in the nucleus and nucleolus. Peripheral chromatolysis is present not only in the centre but also in the periphery of the cell and in the dendrites. These changes are identical with those found in most animals after section, destruction, or slight injury of the peripheral nerves. From his findings in the sciatic nerve in experimental infection Nichols considers that lesions of the peripheral nerves in typhoid fever in human beings are common, and that post-typhoid hyperæsthesia and paralysis are due to this cause.

---

[1] Journal of Experimental Medicine, vol. iv., No. 1.

Renal Typhoid. Lately the subject of renal typhoid has been attracting more and more attention. During the past year Otto Rostoski[1] has given a *résumé* of former publications upon this subject and has related two additional cases. His first case was admitted on the eighth day of the disease. The urine was found to be of brownish-red color from the presence of blood, and to contain albumin. Blood was present up to the thirtieth day of the disease, while the albumin persisted up to the time of the report. An interesting point in the case is that while Widal and Ehrlich's tests were positive, no typhoid bacilli were found in the urine. During the early days of the patient's stay in the hospital the urine was scanty and of high specific gravity. Later in the course diuresis was present to a high degree, and the specific gravity fell to a point lower than the normal. Owing to the fact that there was a history of preceding œdema it is probable, as Rostoski suggests, that the patient had had a preceding chronic nephritis, which was increased by the acute inflammation. In the second case which he reports the attack began with a severe chill, which was repeated, and with frequent epistaxis. The urine was dark red in color and contained both albumin and blood. At first many red cells, but no casts, were present in the sediment. In a few days, however, epithelial casts appeared. In this case typhoid bacilli were found in the urine. There were no uræmic symptoms, no œdema, and no increase of arterial tension. The urine was diminished only during the first three days. Albumin and blood were present for about two months, but some albumin persisted until three months after the attack, when the urine became normal.

Perforation of the Bowel. The difficulties in the way of the certain diagnosis of the occurrence of perforation in the course of typhoid fever are well recognized. The determination of the "preperforative stage" of typhoid fever has now been shown to be perfectly possible, in many cases at least. Nevertheless, it is often impossible to detect such a stage unless our facilities for observation are unusually complete. An interesting article upon this subject has appeared during the past year by George P. Yale,[1] who reports ten cases of this condition, in all but one of which the onset was gradual, the symptoms of collapse being delayed from eighteen to twenty-four hours. In none of his cases was there noted immediate primary shock. One patient complained on the eleventh day of sharp pain below and to the right of the umbilicus, which passed away. On the next day vomiting occurred, and liver dulness was found to be absent. Laparotomy was performed and disclosed a general peritonitis. After irrigation with salt solution, drainage was used, and the patient recovered in spite of going through a severe relapse later in the course of the disease. A second patient, one month after the onset of his illness, complained of slight pain in the abdomen, which suddenly became very much more acute on the next day, while at the same time vomiting and hiccough appeared. In spite of the absence of tenderness on palpation of the abdomen and the preservation of liver dulness, operation was performed, but death followed in forty-nine hours. At autopsy there were found general peritonitis, numerous healed typhoid ulcers, and one suppurating mesenteric gland. A third case is detailed of a man who, on the twenty-sixth day of his illness, complained of pain at McBurney's point. Examination showed absence of liver dulness, the abdomen tumid, but still soft and painless on pressure. On the next day two large hemorrhages occurred and were followed by death on the same day. At autopsy the abdomen was found filled with thin, yellow pus, and the last two feet of the ileum were occupied by almost continuous typhoidal ulceration.

---

[1] Münchener medicinische Wochenschrift, February 14, 1899.

A case similar to the one reported by Yale is given by Platt,[2] where operation was performed twelve days after the onset of the disease because of the occurrence of perforation. The patient recovered in spite of the fact that his convalescence was complicated by a relapse. The same author reports a case of perforation occurring on the twentieth day of the disease, with operation eighteen hours after the occurrence of the accident. Death followed eight and one-half hours after the operation. Seventeen cases in addition to the 83 collected by Dr. Keen are added from the literature. This number, with Platt's own cases, makes a total of 103, with 21 recoveries (20.3 per cent.). Yale insists upon the necessity which has so strongly been urged by others for early operation so soon as the symptoms of perforation set in.

---

[1] Edinburgh Medical Journal, April, 1899.

[2] Lancet, February 25, 1899.

Although the diagnosis of perforation is at times difficult, yet if one bears in mind the few *sudden* accidents which can happen, a diagnosis of this lesion by exclusion can usually be made, particularly if it is possible to have the leucocytes counted promptly. Internal hemorrhage has a series of symptoms which are usually so well characterized that this condition need give rise to but little consideration in accounting for the symptoms produced by supposed perforation. The most difficult case that has ever come under my own observation, where the question of perforation and operation had to be settled, was that of a man who late in the course of typhoid fever suddenly developed intense pain in the abdomen, with rapid distention. There was present no vomiting, no hiccough, while the area of liver-dulness remained unaltered. In this case the pain was far more acute than is ordinarily observed in the case of perforation, yet it was only upon the occurrence of sudden relief of pain, shortly after its onset, by the passage of a large amount of flatus and immediate disappearance of tympany, that I felt at all certain that perforation had not occurred. Precisely the same thing was repeated in this case, after the lapse of a few days, with somewhat longer duration. The only way I could account for the symptoms and the accompanying collapse was by kinking of the intestine with the accumulation of gas.

Sequelæ. GOITRE. E. W. Pressly[1] has reported the cases of two patients, aged fourteen and sixteen years, who were each the subject of goitre of considerable size before they contracted typhoid fever. In both patients the goitre diminished after the attack to such an extent that it could be noticed only on close inspection, and in the three years following the illness in neither case had the goitre again increased.

On the other hand, in December, 1898, I had under my care a patient with typhoid fever who showed progressive enlargement of a pre-existing goitre during the early febrile period of her disease, the gland attaining its previous size before convalescence had been fully established.

A curious sequel of typhoid fever is EXOPHTHALMIC GOITRE, which I have seen in one case where it followed so closely the acute stage in an attack of typhoid fever that it was impossible to overlook the etiological connection of that disease. Before the infection there was no suspicion of Graves' disease, whereas during convalescence the clinical features of exophthalmic goitre became more and more marked.

In the *Philadelphia Medical Journal* of February, 1898, I reported a case of "STRICTURE OF THE ŒSOPHAGUS FOLLOWING TYPHOID FEVER." Another example of this sequel has been reported by Mitchell. Dr. C. H. Ingram, of Pittsburg, has communicated to me the history of two other cases coming under his observation which exhibited the same sequel. The explanation of the occurrence of this unusual sequel is found in the discovery of œsophageal ulcers in the course of this disease, a marked example of which was shown by Riesman at a meeting of the Pathological Society of Philadelphia.[1] Four shallow ulcers were found on the anterior wall of the œsophagus in a line reaching downward from the base to the pharynx. The four ulcers, together with the intervening tissue, measured 23 mm. in length; the largest ulcerated area measured 7 mm. long by 4 mm. wide. The centre of the ulcers was slightly depressed below the margin, although the ulcerated surface as a whole was somewhat elevated above the surrounding mucous membrane. Throughout the whole œsophagus the lymphoid nodules were very prominent.

---

[1] Philadelphia Medical Journal, June 24, 1899.

The question of EPIDIDYMITIS and ORCHITIS following typhoid fever was noted in PROGRESSIVE MEDICINE last year. Since then other cases have been reported, among which might be mentioned one by Beckett,[2] where purulent epididymitis occurred during the fourth week of the disease. The abscess was opened, but no statement is made as to the bacteriological examination of the pus. Orchitis occurring during the course of a relapse in typhoid fever has been reported by F. E. Bunts.[3] The testicle finally softened and broke down. Upon its removal it was found entirely disorganized, with a considerable amount of pus present. Examination of the specimen showed that it contained practically pure culture of typhoid bacilli.

TYPHOID SPINE. The moderately frequent presence of pain in the back, with neurasthenic symptoms, following typhoid fever, which was first fully described by Gibney, has given rise to the term "typhoid spine." Occasionally the pain in the back is due to spondylitis, and is not functional or an evidence of nerve exhaustion. The condition was well illustrated in a case under my care six months ago at the Pennsylvania Hospital. In this man there was persistent and increasing lumbar pain, which began a few weeks after recovery from an attack of typhoid fever with relapse, and constantly increased. The patient applied for readmission to the hospital, when there was found to be intense tenderness over the bodies of the three lower lumbar vertebræ. The pain was severe and was increased by rotation or rocking of the pelvis and by jarring on the crown or the heels. It extended round to the front of the abdomen, and was accompanied for a time by retention of urine which necessitated catheterization. Support by extension and a plaster-of-Paris jacket was at first tried, but the plaster had to be soon removed, owing to increase of pain. Distinct relief was produced by frequent applications of the Paquelin cautery, and the patient finally fully recovered after prolonged rest. During the past year Quincke[1] has reported two instances of post-typhoidal spondylitis. In both of his cases there was unusually severe and extensive local pain, with great swelling of the soft parts. The symptoms rapidly disappeared under treatment.

---

[1] March 19, 1899.
[2] Southern California Practitioner, March, 1899.
[3] Medical News, March 25, 1899.

PERIOSTITIS. Würtz[2] has collected sixty-eight cases of post-typhoid periostitis from the literature. He found that 8.8 per cent. of these occurred between the first and tenth years of age; 32.3 per cent. between the tenth and twentieth year; 20.6 per cent. between the ages of twenty and twenty-five; while 38.3 per cent. occurred in patients older than the latter age. The tibia was most frequently attacked. Among six cases of primary sternal osteomyelitis found in the literature, only two occurred after typhoid fever. The author reports another case of this rare lesion occurring in a child aged eight and a half years. A tumor was noticed over the sternum on the sixteenth day, and on the twenty-third day pus was obtained by puncture. It was noticed that the tumor diminished in size on inspiration. Fluid removed on the twenty-ninth day was found to contain pus-corpuscles, fat, hæmatoidin crystals, leucocytes, fibrin, and elastic tissue without alveolar arrangement. Later it was noticed that the tumor not only varied in size with respiration, but that cardiac pulsation was communicated to it. By the thirtieth day a distinct defect in the sternum could be outlined. Incision on the thirty-second day showed that the whole body of the sternum was necrotic, and that the abscess cavity reached on both sides to the costal pleura. Death occurred on the thirty-sixth day. In the pus from the substernal abscess Eberth's bacillus was obtained.

Treatment. During recent years the discussion of the treatment of typhoid fever has taken renewed activity, owing to the more general use of the Brand method of treatment by means of systematic cold plunging. The former methods on the expectant plan or by the use of intestinal antiseptics have almost universally given place to the use of hydrotherapeutic measures.

HYDROTHERAPY. At present there are two opinions in regard to the best method of treatment. Many hold that the routine use of the plunge bath at a uniform temperature, for all patients, at stated intervals, whenever the temperature of the patient exceeds a certain point, is to be rigorously employed. Numerous statistics are brought forward to prove that the introduction of the Brand system of treatment has markedly lessened the mortality from this disease. While in some cases the value of these statistics has been rather discounted, there can be no doubt that, on comparing the death-rate under the former expectant plan with the Brand system, the latter shows a marvellous improvement.

---

[1] Mittheilungen aus den Grenzegebeiten der Medecin und Chirurgie, 1899, p. 244.

[2] Jahrbuch für Kinderheilkunde, 1869, Band xlix., Heft 1.

There would appear to be an increasing number of men with ample opportunities for observation who question the propriety of the rigorous use of Brand's method. Among these I must count myself one. The comparison between the death-rate under the expectant plan of treatment and under the strict treatment of plunges at regular intervals is not, to my mind, a fair way of judging the best method of treating typhoid fever. While it is undoubted that the introduction of the Brand method of treatment has produced decidedly beneficial results, it does not necessarily follow that this method, which has created such a revolution in our ideas of the treatment of typhoid fever, should be in reality the very best plan to be employed. The general use of the Brand bath treatment has taught us that the routine use of cold water in treating typhoid fever is not only harmless, but has a decided value in combating the ill effects of the infection. After a quite considerable experience in all four methods of treatment, the expectant, the antiseptic, the strict Brand method, and the discriminating use of hydrotherapy, I feel sure that the best results are obtained by the last method. Expressions of opinion are properly held to carry but little weight unless something more tangible can be used to re-enforce them. From the nature of the case statistics cannot be furnished to support the expression of opinion that I have given, inasmuch as among a series of cases many will receive the plan of treatment advocated by Brand, while others will be treated by what might be called a modification of Brand's method, and still others with the use of the milder forms of hydrotherapy. Such results cannot be compared with those obtained in series of cases where the Brand method alone is adopted. I am aware that these practices would be considered rank heresy by the strict followers of Brand. The latter, with some show of reason, claim that inasmuch as we can never tell at the onset of an attack to what grade of severity the case will arrive during its future course, the Brand method should be started from the very onset in order to maintain the patient's condition and to prevent his state from becoming so serious that the bath treatment cannot be later carried out. This reasoning would be perfectly proper should no hydrotherapeutic measures be employed at the start. However, it does not seem reasonable to believe that in the early stages, when the temperature-range is not high, when the circulation is well maintained, and where the nervous system is in fairly normal condition, such an active measure would be necessary as would later be requisite after more prolonged and more intense intoxication by the products of the typhoid bacillus. If in the early stages we can combat the ill effects of toxin formation by milder measures than the systematic use of the cold plunge, there is no reason why, when the condition becomes more grave, the organs should not be in such condition that the systematic use of the plunge cannot be with propriety employed, while many a case can be carried through the whole course of the fever without the employment of what to most cases is quite disagreeable—the cold plunge. Probably no one would think of instituting the systematic cold-plunge treatment in a case treated expectantly until the asthenic symptoms appear in the circulatory, respiratory, and nervous systems. A case treated expectantly without hydrotherapy in the early stages cannot be properly compared to one in which, in the early days of the disease, the discriminating use of hydrotherapeutic measures has been in effect.

The object of the cold bath, as has been frequently pointed out, is not simply the reduction of temperature. Probably more important even than the reduction of temperature is the stimulating effect upon the circulatory, respiratory, and central nervous systems. If the same object in this respect can be accomplished by measures less repugnant to the patient and less difficult of application, especially in private practice, and at the same time if milder hydrotherapeutic measures will effectually control the temperature, it is difficult to see in what way the Brand method is superior to those more easy of performance. The ardent advocates of the Brand method claim that such effects are not produced by modified hydrotherapy as are accomplished by the systematic Brand method. With this I cannot agree.

An important point in regard to the carrying out of the Brand method is the regulation of the temperature of the bath. I believe that excellent results are obtained in the reduction of temperature and in the stimulation of the respiratory, circulatory, and nervous systems, when the bath is employed with a temperature of 85° F. at the start, the temperature being lowered by the addition of ice-water in cases where it is desirable, while the discomfort to the patient and the dread of the coming plunge is far less with this temperature than where a temperature in the neighborhood of 68° F. is used at the outset of each bath. So far as temperature reduction is concerned, it seems to me that equally good results are obtained with this as with the more disagreeable method, partly, I believe, because of the fact that with the higher initial temperature of the water the blood is not so promptly driven away from the skin by the contraction of the superficial arterioles. The question of the degree of lowering of temperature which is desirable by hydrotherapeutic measures is one that I am sure will still stand discussion. I cannot believe that the reduction of temperature from 102.5° F. to the normal point is by any means necessary, while I do believe that we should be contented with a drop of from 1.5° to 2° F.

The use of INTESTINAL ANTISEPTICS, about which a few years ago so much was being written, receives but little attention nowadays. It cannot be claimed for a moment that by the use of any internal medication we hope to destroy the typhoid bacillus after it has once gained entrance into the economy. In spite of this, however, intestinal antiseptics may, and I believe do, have a place in the treatment of cases of typhoid fever. In this disease we have, in addition to the specific tissue-changes produced by the typhoid bacillus in the lymphadenoid structures of the bowel wall, more or less general catarrhal inflammation of the whole intestinal tract. While much of the tympany sometimes seen in this disease is due to the weakening of the muscular coat of the bowel, doubtless some of it is due to fermentative and putrefactive changes occurring in the intestinal contents. As it interferes in no way with other measures which we employ in combating the disease, and as there is a fair probability of an increased saprophytic activity in the intestinal canal, the reaction against intestinal antiseptics would seem to be unnecessarily marked. Owing to the nature of the disease we are prevented from clearing the intestinal canal of irritating material by the use of purgatives by the mouth except during a short period of the disease ; and, as irrigation by the bowel cannot reach a sufficiently high point to be effectual, it seems proper to check the fermentative changes supposed to be taking place in the only other available manner—by the use of intestinal antiseptics. Of these the choice may be said to lie between beta-naphthol and salol. Undoubtedly either of these drugs can aid in inhibiting the growth of micro-organisms in the intestinal contents. My own preference is for beta-naphthol, which I give in doses of 3 to 5 grains in capsule every four hours. With guaiacol carbonate I have had no experience as an intestinal antiseptic in this disease, although its use has been highly extolled in some quarters.

Occasionally there are still seen reports of cases supposed to be either aborted or cured by the use of the so-called WOODBRIDGE TREATMENT. With this plan of treatment I have had no experience, and never will have until my ideas of the etiology and pathology of typhoid fever have undergone such a radical change that I shall be compelled to come to the conclusion that all our present views in regard to the disease have no foundation in fact. It would take far more than a mass of statistics tenfold the size of those already brought forward, composed of cases under the observation of men whose judgment I could thoroughly trust, before I could be convinced that after failure of prevention we are capable of doing more than carrying our patient through his illness. In addition to this I consider that the active medication advised in this so-called method of aborting the disease is by no means free from danger. In connection with this plan, as in so many other things in medical literature, we have to bear in mind that the failures are not reported, and that collections of cases from the literature would, *à priori*, be uniformly favorable for obvious reasons, of which I think the chief would be that no one would particularly care to appear in print as advocating a plan of treatment deemed unsafe by many if the cases upon which he had used it bore out the unfavorable opinion of a large majority of the profession.

INTESTINAL HEMORRHAGE. There would seem to be a lack of unanimity of opinion in regard to the best methods of combating the intestinal hemorrhage in typhoid fever The elevation of the foot of the bed, the ice-cap over the right iliac fossa, and limitation of diet are used by practically all physicians. Various drugs have been recommended, varying from purgatives to opium, and the advocates of each plan of treatment can report large numbers of cases where the medication employed seemed to be of value. Probably no one drug is more used in combating this accident than is ergot. While doubtless many cases of intestinal hemorrhage cease after its use, it is difficult to see in what way ergot can check the bleeding from an eroded bloodvessel in the bowel-wall, as it depends for its hæmostatic power upon its ability to cause contraction of the muscular coat of the arterioles. In a section of an inflamed Peyer's patch the bloodvessel walls are seen to be thickened and infiltrated with young cells ; presumably, therefore, their calibre cannot be as readily altered as would the healthy vessel wall. If ergot cannot cause contraction of the ruptured bloodvessel it is impossible to explain any way by which it could cause a stoppage of the bleeding. If ergot cannot do good in this condition it is not only useless, but it may actually do harm by contracting the healthy peripheral arterioles of the body, and thereby increase the work of an already embarrassed heart. The use of purgatives in this condition seems to me absolutely irrational. Nature's method of stopping the hemorrhage is by the formation of a thrombus at the mouth of the open vessel. Every intestinal contraction can be supposed capable of dislodging such a clot, thus allowing the occurrence of fresh hemorrhage. Personally, I have always used the following combination :

℞.—Extracti opii	gr. ½.
Plumbi acetatis	gr. ij.—M.

Ft. in pil. No. i.

Sig.—One pill every three hours until at least eighteen hours after the last evidence of bleeding.

I always feel, however, as though it were very likely that the acetate of lead in this prescription is useless, and that hemorrhage is controlled partly by the diminution of work imposed upon the bowel by the use of peptonized foods in small quantities and by the opium contained in the pill. The above remarks are incited by an article that not long ago appeared, in which the importance of evacuating the bowel promptly in cases of intestinal hemorrhage was urged. This seems to me to be entirely irrational and capable of doing a vast amount of harm.

The question of the DIET IN TYPHOID FEVER is one that is receiving a considerable share of attention, and it is not improbable that our views in respect to this matter may undergo a radical change at a not very distant time. In the corresponding volume of PROGRESSIVE MEDICINE for last year the subject of more liberal feeding in typhoid fever received considerable attention. During the present year no articles upon the subject have come to my notice. While I would gladly feel justified in increasing the diet of my typhoid patients, I have not as yet the courage to depart from the rule so long established, of giving only liquid diet until the temperature has reached the normal point for several days.

The argument that milk ceases to be a fluid shortly after its entrance into the stomach is one of the strongest points in favor of departing from the long-established custom of giving milk freely in this disease. There is one fact, however, somewhat in favor of the almost exclusive use of milk, namely, that we can quite easily determine its passage into the bowel in an undigested form by the appearance of curds in the stools, so that we have in this way some guide, which is present with few other articles of diet, to the capacity for digesting. It is a good plan to have all milk peptonized upon the occurrence of intestinal hemorrhage. In this way we insure its digestion in the stomach and the absence in the intestine of solid masses of curd which might act mechanically in removing the thrombus or by causing an increase in peristaltic movement, which would tend to again start the bleeding.

The question of the TIME OF THE RESUMPTION OF SOLID FOOD after the subsidence of an attack of typhoid is one upon which we need more definite light. It is not improbable that before long some satisfactory theory for the occurrence of relapse will obtain sufficient proof to enable us to exclude the idea that feeding at too early a date is capable of causing a relighting of the disease. While frequently a relapse occurs soon after the resumption of other than liquid food, relapses occur so frequently while the patient is still upon the same diet that has been employed through the earlier part of the attack, that there evidently must be some cause within the intestinal canal or its appendages causing a relighting not excited by change of diet. Recently the retention of active typhoid bacilli in the gall-bladder has been brought forward as a possible explanation for this question. While there is much to render this theory attractive it is not as yet firmly established. With removal of the fear of producing a relapse by an early increase in the diet of our patients during convalescence, we may soon see our way clear to doing what has been advocated by some, namely, allow our patients' appetite to guide us in the selection of the dietary.

TYPHOID ANTITOXIN. In pursuance of his theory that the antitoxin bodies in typhoid fever may be contained in larger quantity within certain organs than in the blood, Jez[1] has published the results of further observations upon the subject, which was treated by him in a report during 1898. Having confirmed the observations of others in regard to the immunizing power of convalescent blood in typhoid fever, but having found it valueless as a means of combating the existing disease, he attempted to obtain from the organs a higher degree of antitoxic strength in the hope of obtaining a curative material. Extracts of normal organs—liver, spleen, lymphatic glands, thymus, bone-marrow, brain, and spinal cord—were found to have no antitoxic action when given either by mouth, subcutaneously, or injected into the peritoneal cavity either before or at the time of infection of rabbits. It was found, however, that the extract of organs removed from an animal some days after inoculation with typhoid bacilli had a high protective power against typhoid fever. The organs were removed from a rabbit on the sixth day after it had received its second inoculation with typhoid bacilli in pure culture. The bone-marrow, spleen, thymus, brain, and spinal cord were rubbed up into a thick mass, mixed with salt, alcohol, and water, and allowed to stand in a cool place for twenty-four hours. The mixture was then filtered and the filtrate used for experimentation. On injecting this filtrate with an equal quantity of typhoid culture the animal remained alive, although a control animal died in six days. A second similar experiment, but with a larger quantity of the extract, with the same result following, is detailed, and it is said that others showed a similar protective action of the extract. The next step was to try the effect of a similar extract in human beings. In order to obtain an extract for this purpose he injected two-day-old bouillon culture of typhoid bacilli into the abdominal cavity of rabbits and repeated the injection again in a few days, using an older culture. If the animals remained healthy these were repeated with older and more virulent cultures. When the animals failed to react to these very poisonous doses they were killed, and the organs mentioned above were at once removed, chopped up, and rubbed up in a mixture of salt, alcohol, and glycerin, to which a small quantity of carbolic acid and some pepsin were added. The mass so obtained was placed on ice for twenty-four hours and then filtered. The filtrate, which is called antityphoid extract, is a more or less red fluid. From 300 to 400 grammes of this were given to his patients—three in number,—in divided doses of from 3 to 10 c.c. several times daily until the temperature reached normal, when it was given in less frequent doses. The author claims that the temperature-curve becomes remitting from the outset, and in a short time becomes one of apyrexia. The duration of the fever seems dependent upon the strength of the extract. The apyretic periods following the use of the extract are not accompanied by symptoms suggesting collapse; the pulse, on the contrary, is said to become stronger, fuller, and more rhythmical. In some cases free sweating was produced. The dulness, somnolence, and delirium are said to disappear and the tongue to become moist and clean, while diarrhœa ceases and the quantity of urine daily increases. The appetite soon returns, and the patients could leave the hospital after a convalescence of two weeks. Eighteen cases were treated by this means; the temperature-charts of three of them accompany the article. In these there seems to be a fall of temperature after each administration of the extract, and apyrexia was attained on the fifteenth, sixteenth, and seventeenth days of the disease. A peculiar feature of the extract is that it seems to act more effectually when given by the mouth than when injected beneath the skin.

---

[1] Wiener klinische Wochenschrift, February 18, 1899.

The results claimed are such as to make it desirable that they should be either confirmed or refuted by further investigation and by different observers. That an antitoxin to typhoid fever will ultimately be made available is well within the range of probability; but whether the method of obtaining it set forth in Jez's article is the one that will stand the test of experience, still remains to be determined. It is to be regretted that the directions for making the extract are not a little more explicit.

Repeated Attacks. The question of a possible return of typhoid fever after a typical attack of that disease has always been considered an unusual occurrence. Within the last five years I have seen four cases with undoubted second attacks of typhoid fever. In two of these the first attack occurred one year before the return. In both cases the patients were treated for both attacks in the same hospital, and showed undoubted evidence of the true nature of the disease on both occasions. Another of the cases had had the first attack, which apparently was not a severe one, five years before the attack in which I saw him—an attack which was well marked, but did not present any unusual features. The fourth case had had her supposed first attack fourteen years before I saw her in the return. From the description of the disease given by herself and later by her mother I feel no hesitation in recording this case as an instance of a second attack of the disease. Remlinger[1] has examined the literature to determine, if possible, the frequency of second attacks. He found that a history of preceding typhoid fever was given by 2.54 per cent. of cases observed in the army, while 0.79 per cent. were said to have had "mucous fever." Remlinger found in literature thirty-one true cases, the interval between the attacks varying from five months to thirty-nine years, the greatest number occurring in the first five years after the first attack. Brouardel is quoted as having reported four return attacks. (One case of Eichhorst had three attacks.) He has analyzed the severity of the different attacks, and finds that the severity of the second as compared to that of the first attack was greater in ten, less in thirteen, and equal to the first in eight. Remlinger attributes these second attacks to the presence of the bacillus in the intestine in the normal state of the individual. In two of his cases the Widal reaction was negative at first, but later positive. In two the reaction was not tested until late, but was then found positive.

---

[1] Revue de Médecine, April, 1899.

MALARIA.

Etiology. Having contributed so much to our knowledge of the life-history of the plasmodium outside of the human body, Ross has now considered the ways in which the knowledge gained by him may be rendered practically useful. In the *British Medical Journal* for April 1, 1899, he reviews the life-history of the plasmodium, and mentions so much of the biology of the mosquito as bears upon the question of prophylaxis of malaria. The larvæ of the mosquito take about a week to mature in water. The anopheles float upon the surface of the water and not with the head down, as is the case with the variety culex. Ross states that the breeding pools of the anopheles must be large enough to exist for a few days in order to allow the larvæ to mature, and yet must not be sufficiently large to contain minnows, which devour the larvæ. He thinks that the haunts of the culex are too common to be entirely done away with, but that in the case of the anopheles—fortunately, the form acting as host for the plasmodium—the pools might be rendered free from mosquitoes by the local authorities. The life-habits of the anopheles and their places of habitation form confirmatory evidence of what must be considered as proven, namely, that they alone are capable of inoculating malaria in the human subject. These being, as Ross calls them, "puddle-breeding" mosquitoes and not the variety that dwells in large bodies of water, their extermination is simply a question of filling up such puddles and draining marshes. The fact that the larvæ of anopheles floats with its head upon the surface of the water, as is pointed out particularly by Ross in this article, gives ground for believing that the attempt to exterminate mosquitoes and malaria by the use of kerosene or petroleum products may be an efficient measure.

Ian MacDonald[1] has investigated the question as to whether in fever-stricken localities of Spain the distribution of the plasmodium-transmitting mosquito is associated with the presence of malarial fever. The territory studied covered an area of sixty miles. Twelve districts were examined, nine of which were malarious and three free from that infection. In the three healthy districts he found no specimens of either anopheles claviger, anopheles pictus, or anopheles bifurcatus, while in the malarial districts these forms were present with four forms of the variety culex. In pools of the fever districts he always found with ease the larvæ of anopheles, in one very malarious region the anopheles pictus being present in very great abundance. MacDonald cites the case of a man who always took the most minute precautions against being bitten by mosquitoes. The man's servant, who failed to take such precautions, had malaria in severe form. The only variety of mosquito present in the neighborhood was the anopheles claviger. MacDonald adduces additional proof that the culex variety is harmless as regards the transmission of malaria, and that the plasmodium is the inhabitant of the anopheles claviger.

---

[1] British Medical Journal, September 16, 1899.

Bastianelli and Bignami[1] have still further studied the development of the parasite of tertian malaria in the mosquito. They make use of the word *gameti* to describe the forms of the parasite not proceeding to sporulation, but apparently acting as the forms which continue the existence of the malarial parasite outside of the human host. Fewer of these seem to exist in the circulating blood in the tertian than in the æstivo-autumnal form of parasite. The crescentic form are supposed to be the gameti of the æstivo-autumnal parasite, and this form develops in the bone-marrow, where the various stage of the development of the crescents can be seen. When matured in the bone-marrow these perpetuated forms, as they may be called, of the æstivo-autumnal parasite enter into the circulation in large numbers. In the blood of tertian ague these perpetuated forms appear in only small numbers in the circulating blood, and just before a chill. For the tertian parasite the authors quoted found that there are two forms of the gameti—a male form called micro-gametocytes, and female forms, macro-gameti. By various staining methods these two forms were found to differ both in the situation of the nucleus and in the amount of chromatin present. In the male form chromatin-bearing flagellæ are found. Apparent evidence of the fertilization of the macro-gameti was furnished by the finding of chromatin filaments within those bodies. Inoculation experiments were performed which seemed to conclusively prove that mosquitoes containing the encapsulated form of tertian parasite could infect man with the tertian type of fever, while the same was the case in the production of æstivo-autumnal fever with the mosquitoes in the stomach-wall of which encapsulated forms of that variety of the parasite were found.

---

[1] Estratto del Bulletino della R. Accademia Medica di Roma, 1898 and 1899.

The Report of the German Commission for the Investigation of Malaria in Italy, under Koch,[1] deals with the examination of a large number of malarial cases. Of these thirty-two were tertian, five æstivo-autumnal, and five combined forms. All of the cases belonging to the æstivo-autumnal group were considered to be in reality true tertian cases, differing in no way from tropical fever, and the Commission accounts for the relatively large number of these cases in Rome as compared with Africa by the fact that in Africa the cases were brought at once to the hospital as soon as they became ill, while in Rome they had been infected a long time, and were under the influence either of quinine or of beginning immunity. No marked difference between the æstivo-autumnal parasite and that of tropical malaria could be discovered, except for the fact that the parasite seen in Italy was sometimes larger and more distinctly pigmented than was that seen in Africa. By the use of Romanowsky's stain Koch found chromatin bodies in the crescentic form of plasmodium, and he looks upon them as spermatozoid in nature and not as flagellæ—a view in harmony with the observation of MacCallum upon the halteridium. Koch found in Rome a confirmation of the facts previously observed by Ross in India regarding proteosoma found in the stomach of mosquitoes.

An interesting portion of the report is that dwelling upon the freedom of Rome from malaria in comparison with the prevalence of that infection throughout the Campagna, and the bearing of this relative freedom upon the older theories in regard to the method of malarial infection. The absence of malaria in Rome is not caused by any peculiarity of the air, as this reaches the city after blowing over the Campagna on all sides. It is not due to any peculiarity of the water-supply, as this is brought to the city from the malarial region partly in open conduits. That it is not due to any peculiarity of the food in the two districts is shown by the fact that the Campagna furnishes the city with a large amount of its food material. The only difference between these two regions—one of which completely surrounds the other—is the fact that Rome has little vegetation and is free from mosquitoes, while the Campagna swarms with various kinds of these insects. Wherever in Rome there is much vegetation, as in gardens, mosquitoes and malaria are both found.

The study of the life-history of the mosquito, as well as that of the plasmodium of malaria, has caused renewed interest to be taken in the destruction of the mosquito. As has been mentioned, Ross spoke of the possibility of destroying the mosquito in a given locality by removing its breeding places. Inasmuch as this method might be impossible, other methods of destroying the insect may play a valuable part in preventive medicine. In the *Therapeutic Gazette* of October 15, 1899, there is an article by Celli and Cassagrandi bearing directly upon this subject. It has been found that the minimum resistance is offered by the larvæ directly after its exit from the egg and by the mosquito soon after it develops from the nymphæ, while the greatest resistance to destructive influences is exhibited at the time when the larva is about to become a nympha, and by the developed insect captured in the air. Celli and Cassagrandi point to the fact that in experiments of the kind which they have undertaken it is necessary to employ insects which have been recently captured and not those which have been living at the laboratory for any time. Their experiments were performed upon mosquitoes freshly captured from the Roman Campagna. Other circumstances which might impair the validity of similar experiments have been noted by them, among others the appearance of the "waxy whitening" of their bodies, due to some condition which renders them less resistant to the action of destroying agencies. They have divided culicidal substances into those which kill the eggs, those which kill the larvæ, those that kill the larvæ and nymphæ, and those that kill the perfect mosquito. The variety of mosquitoes employed by them seems to have been chiefly the culex pipiens, because it was more easy to obtain in quantity than were other varieties. This is somewhat unfortunate, inasmuch as it may be asserted that the anopheles claviger is the plasmodium-bearing variety. After speaking of the work done, especially in this country, by the use of petroleum and permanganate of potassium, they give the results of their own experiments. Among 198 substances which were found not to kill the larvæ of mosquitoes within seventy-two hours, they speak of permanganate of potassium in the strength of 1:1000; arsenous acid in ammoniacal solution, various soaps, petroleum, ammonia, tannic acid, borax, carbonic acid and sulphurous waters. Twenty-two substances are enumerated which kill the larvæ of mosquitoes within the space of seventy-two hours. Among these they mention potassium permanganate, 5:1000, besides corrosive sublimate, 1:1000; sodium chloride in the strength of 5 to 10 per cent.; extract of tobacco in 10 per cent. solution; sulphate of copper, 1 per cent.; sulphate of iron, 1 per cent.; coal tar; ammoniacal water from coal-gas, and bichromate of potassium. Twenty-three aniline colors were found to kill larvæ within forty-eight hours. Other experiments were directed to the determination of materials which would kill both the larvæ and the nymphæ. The destruction of the latter was difficult, except in the case of oily substances which floated upon the surface of the water. Among substances of this class sulphurous water saturated with SO_2, and then potassium permanganate mixed with hydrochloric acid, were found to be effective. Petroleum and common oil were found to act well, as also were the commercial insecticide powders made from chrysanthemum flowers. The active principle of these flowers is soluble in water and kills both larvæ and nymphæ. Chloride of lime, caustic lime, and ammonia were found to act only in strong solutions. Curiously enough, it was found that formalin, lysol, and corrosive sublimate were not very active substances to employ against the mosquito. It was found that the addition of certain mordants, such as sulphate of iron, lime, chloride of sodium, and other salts and acids, to galol hastened the action of this material. It was also found that direct sunlight rather increased the efficacy of the dyes which were experimented with, and that its only effect upon the use of petroleum was through the heat that it developed. In order to test the value of the aniline colors in the destruction of mosquitoes, experiments were performed with galol and green malachite in marsh water, and it was found that they acted as well as in water from another source. The same was true with sulphurous water. Insecticide powders from chrysanthemum flowers were also found to act well in both these kinds of water. In powdered water it was found that the efficacy of petroleum was diminished, as was also true of the other substances mentioned except galol. It was found that the only action of petroleum was a purely mechanical one, depriving the insects of air. The experiments mentioned above were all performed upon the genus culex, but the authors have concluded from a less complete study upon the anopheles that the same results could be expected. Experiments were undertaken to determine the length of time during which the various substances used would retain their activity. They found that galol retained this for a longer time than did the other substances. In regard to the practicability of the various substances used to kill the larvæ and the nymphæ, the authors say of petroleum that it is easy to use and that it does not kill the other inhabitants of the water, but that herbivora will not drink water so treated. One disadvantage of its use is that in stagnant waters vegetation on the surface may interfere with its spreading evenly. The only form of petroleum that could be used in this way is one of the lighter kinds of commerce, as some of the forms sold will not spread over the surface but remain in large drops. The disadvantage of the insecticide powders made from chrysanthemum flowers is that they are poisonous to some worms, mollusks, and fishes, although not poisonous to the herbivora. The coloring matter experimented with destroys almost all animals in proportions that would be used for purposes of destroying the mosquito. The price of the materials limits the list of available culicidal substances to the vegetable powders, coloring substances, and petroleum.

---

[1] Deutsche medicinische Wochenschrift, February 2, 1899.

In experiments to determine what substances would kill the perfect insect, it was found that volatile oils and fumes were effectual. Turpentine, iodoform, tobacco, and sulphurous oxide, the odors of nutmeg, camphor, and garlic, and the fumes of chrysanthemum flowers, fresh eucalyptus leaves, quassia wood and pyrethrum, all kill the perfect insect, but the smoke of firewood acted equally well. Among other conclusions the following occurs: "The problem of the destruction of mosquitoes is experimentally soluble, but practically it will only be so when the economic interest desires it. In this latter sense it is remarkable that the old larvicidal use of petroleum has not become much diffused even in those places where it is very cheap, and it is probable that those substances which destroy other aquatic creatures injurious to agriculture will be preferred, or still more those which can be had by cultivating them on the spot. For example, by growing on a large scale the chrysanthemum flowers (*Chrysanthemum cinerariæfolium*), from which the culicidal powders are obtained, it is very probable that one will succeed in making the malarial place itself produce that substance which will free it of the mosquitoes that infest it."

The Blood in Malaria. An interesting report upon the results of examinations of the blood of soldiers returning from Cuba during the summer of 1898 has been made by James Ewing.[1] Eight hundred examinations of the blood of these cases were made, 605 proving to be subjects of malaria. In these 605 cases plasmodia were found in the blood in 335, while in 270 the diagnosis was made by the history and by the discovery in the blood of signs other than the plasmodium indicating the existence of malaria. In the 335 cases in which the plasmodium was found, the ring form of the æstivo-autumnal parasite was found in 88, crescentic bodies in 134 cases, while both rings and crescents were present in 27 subjects. The association of the æstivo-autumnal and the tertian parasite was present in 12 cases. The æstivo-autumnal parasite was found in 261 cases in all; the tertian parasite alone was found in 74, while it was present associated with the æstivo-autumnal parasite in 12. Among 159 cases of typhoid fever whose blood was examined, 40 showed evidences of recent malarial infection, such as the presence in the blood of pigmented leucocytes, severe anæmia, and clinical history pointing to the previous existence of the latter disease.

The comparative immunity of negroes is noted by Ewing, and he states that he did not see a single fatal case of uncomplicated malaria in the negro, while, as a rule, the fresh and untreated cases showed a very moderate number of organisms in the blood. The cerebral type of malaria was present in a large number of patients. Of 64 cases whose blood was examined during or after a period of coma, crescents alone were found in 33, ring forms alone in 11, ring forms and crescents together in 2, tertian parasites in 5, both æstivo-autumnal and tertian parasites in 2, and no fully identified parasites in 11. He points out the scarcity of parasites in the circulating blood during periods of deep coma in these cerebral cases. The prognosis would seem to be better where the crescent form was present than in those whose blood showed ring forms alone.

---

[1] New York Medical Journal, January 28, 1899.

Coexistence of Typhoid and Malarial Fever. One would expect this association to have frequently occurred among soldiers exposed to typhoid infection in their camps and coming from an extremely malarial country. However, in 159 cases of typhoid fever with intermitting temperature there was no case of undoubted and established typhoid fever in which malarial parasites were found in the blood, except at the onset of the disease or during convalescence, and the attempt to find a single case of typhoid fever and active malaria progressing together was unsuccessful.

Ewing concludes from the study of his cases: 1. That typhoid fever is to a large extent incompatible with active malarial fever, and that during the course of the former the latter infection is usually suppressed. 2. That the presence of old malarial infection may alter the course of typhoid fever through anæmia, but that active sporulation of the malarial parasite very rarely occurs during the course of established typhoid fever. 3. Since malarial paroxysms often reappear during convalescence, a scanty growth of the parasite must often persist during the course of typhoid fever, and it is possible that some of the irregularities of temperature observed in these cases are referable to this partly suppressed growth. 4. That the anatomical evidence of a post-mortem examination is much needed to demonstrate the existence of typhoid fever in cases showing active malarial paroxysms.

Malarial Nephritis. The ability of malaria to produce nephritis has received a considerable amount of attention of late years, and is a subject of great importance. So few cases of chronic nephritis follow an acute inflammation of the kidney that it is important for us to know just what infectious processes are apt to leave behind them permanent damage to the renal tissues. There is increasing evidence that any infection may produce permanent change either of the interstitial tissue or of the tubules of the kidney.

In a case reported by Larned,[1] chronic nephritis seems to have directly depended upon malarial infection. His patient was a child aged seven years and four months, who had probably had malaria for a year. When seen there was marked œdema of the face and of the genitalia and extremities, with ascites. The spleen was found to be enlarged, and examination of the blood showed numerous intracellular parasites, many of

---

[1] Johns Hopkins Hospital Bulletin, July, 1899.

which were segmenting. The urine was of low specific gravity and contained .21 per cent. of albumin and hyaline, fine and coarse granular and epithelial casts. The patient improved under treatment, but finally died in a comatose condition. As no parasites were found in the blood just before death, the coma was probably uræmic in origin. At autopsy the spleen was found to be enlarged, and the kidneys showed chronic, diffuse, interstitial nephritis, with degenerative changes in the epithelium of the tubules. Larned closes his paper with the following conclusions: 1. Certainly, in some localities malarial fever should be given a permanent position in the etiology of chronic as well as of acute nephritis. 2. In all cases of malarial fever the urine should be closely watched. 3. A blood examination should be made in all cases of nephritis occurring in those who have visited or lived in a malarial district, as it often happens that the severe grade of nephritis resulting may mask entirely the clinical picture of malarial fever.

Hæmoglobinuria and Malaria. The question of hæmoglobinuria in its relation to malaria and to the administration of quinine is one that is still under dispute in spite of the large amount of study that has been put upon the subject. Koch[1] has examined forty-one cases suffering from this condition. The specimens of blood were examined dry on cover-slips, with stains. Of these twenty-three cases four died, and of the nineteen others none had any return of the trouble, in spite of the fact that no quinine was given during or after the attack. To explain the absence of malarial parasites from the blood in these cases it has been claimed that the parasites die with the red blood-cells which contain them. Koch denies the correctness of this explanation because were it true the parasite should disappear in every case, whereas in four of his cases parasites were seen during and after the attack (in one case they were very numerous), while in nine cases a later malarial relapse occurred, showing that the parasite does not always die with the red blood-cells. He considers that there is no relation between hæmoglobinuria and Texas fever, because in the latter disease hæmoglobinuria occurs in proportion to the number of parasites and does not cause the parasites to be affected. He states that the correspondence between the amount of hæmoglobinuria and the number of parasites in malarial fever has never been observed among his cases; there was no case in which hæmoglobinuria was present with a large number of parasites in the blood, whereas in many cases with a large number of parasites no hæmoglobinuria was present. For these reasons he concludes that hæmoglobinuria is not malaria. In forty-one cases five were combined with tertian ague. Among twelve cases reported there was only one in which it was not said that quinine had been given. In all of the rest the occurrence of hæmoglobinuric fever followed a few hours after the use of quinine in doses of 7½ to 15 grains. He relates one case where hæmoglobinuria could be produced at will by the use of quinine, and another one observed in Berlin (the patient having come from Cameroon) in whom frequent attacks of hæmoglobinuria constantly followed the use of quinine. This case had lived in Berlin for seven years, when after getting wet the patient had a chill and took quinine to the extent of 0.4 gramme in two doses. On the next day the blood was examined for plasmodium, with negative results, probably because of the doses of quinine. Some weeks later the patient had another attack of chills, fever, and sweating, and the pigmented tertian parasite was found in the blood. Upon the return of the paroxysms on the second day he was given methylene-blue, which he continued for some days. Quinine was then prescribed by another physician, and it had hardly been swallowed when a severe attack of hæmoglobinuria occurred. On subsequent occasions hæmoglobinuria in this case followed the use of small doses of quinine. Koch, therefore, concludes that hæmoglobinuria is not an infection but an intoxication. In answer to the arguments that quinine, as a rule, even if given in very large doses, does not cause hæmoglobinuria, and that this condition has been habitually treated with quinine in large doses, and yet the patient has lived, Koch says there must be a special predisposition to hæmoglobinuria and that as a rule Europeans can take quinine with impunity shortly after going to a tropical climate, but that after a certain time there is danger of producing a hæmoglobinuria by the use of this drug. He suggests that slight resistance on the part of the blood-corpuscles is a predisposing cause of the condition. He has seen dark color of the urine and slight icterus appear after the use of quinine long before the occurrence of hæmoglobinuria.

---

[1] Zeitschrift für Hygiene und Infectionsk., 1899, Band xxx., Heft. 2.

Treatment. QUININE HYDROCHLORATE. Dock[1] advises that quinine be used in the form of the hydrochlorate or be given in capsule, followed by 15 minims of dilute hydrochloric acid, and that it should be administered in the decline of the paroxysm, either in one dose or in divided doses at short intervals.

Ollwig[2] has treated ten cases of malaria with Merck's METHYLENE-BLUE or with the HYDROCHLORIDE OF DIETHYLTOLUTHIONIN. The beginning daily dose of 0.5 gramme was found not to be sufficient, and usually 1 gramme was used. He prefers the preparation last mentioned because it does not produce the incontinence of urine and burning on micturition that sometimes follow the use of methylene-blue. In order to avoid vomiting he gave the medicine in the afebrile period, the whole daily dose being often given within a few hours. In two cases he obtained excellent results, the chills stopping and the plasmodium disappearing from the blood. It does not, however, always prevent relapses. Four of his cases had on former occasions suffered from hæmoglobinuria following the use of quinine.

---

[1] American Journal of the Medical Sciences, July, 1899.

[2] Zeitschrift für Hygiene und Infectionsk., 1899, Band xxxi., Heft 2.

TREATMENT OF HÆMOGLOBINURIA. Koch, in his article upon hæmoglobinuria, previously quoted, advises the following plan in treating this condition: The blood should be examined for malarial parasites. If none be found the patient should be treated symptomatically with measures which tend to thin the free hæmoglobin and prevent the occurrence of renal infarcts of that substance in the kidneys. For this purpose he advises the use of large quantities of fluid. If the parasites are found to be present in the blood he advises waiting for the attack to subside, and then either the careful use of very small doses of quinine, or, what is better, the employment of methylene-blue in doses of 1 gramme daily. In cases where quinine is given the urine should be carefully watched and the drug stopped as soon as a brownish color of the urine is noticed.

PNEUMONIA.

Etiology. The question of the position of pneumonia among diseases is one of considerable importance; this is partly because the general phenomena of the disease frequently far outweigh in importance the extent of physical damage to the lung, a small area of pulmonary consolidation being in some cases attended by far more serious general symptoms than are present in many cases of pneumonia involving a large extent of lung area. The old term of *lung fever* had much to recommend it, inasmuch as the name implied the presence of marked general phenomena due to disease of one organ. The idea, therefore, of the general or infectious nature of pneumonia is one that is by no means new. With the discovery of the pneumococcus and the proven relationship that it bears to true lobar pneumonia, the old idea of pneumonia being a general disease with local phenomena in the lung was shown to be an error, inasmuch as the description should be reversed and the disease described as a local infection of the lung, with general symptoms due to absorption of toxins manufactured by the micro-organism, and of secondary phenomena produced by the invasion of other tissues than the lung by the same causative factor.

The occasional dissemination of the pneumococcus through the blood has been illustrated by Franklin W. White,[1] who examined the blood in nineteen cases of lobar pneumonia during life. Ten of the cases were fatal, nine coming to autopsy. Thirty-two cultures were made from the blood of these cases during life, but in only three (fatal) cases were bacteria found present. In these the organism found was the diplococcus pneumoniæ. Two of these cases with the positive result of blood examnation came to autopsy. In them pneumococci were found in cultures from the liver, lung, heart, and spleen in one case, and in the liver, lung, heart, spleen, pericardium, peritoneum, and kidney in the other.

---

[1] Journal of Experimental Medicine, May to July, 1899.

Epidemic Pneumonia. The occurrence of epidemics of pneumonia has been frequently noted, and among some of the domestic animals epidemic pneumonia is one of the most dangerous of their diseases. While some of the instances of epidemic pneumonia among human beings are not caused by the micro-organism of true, frank, croupous pneumonia, there is no good reason for excluding them from the category of the pneumonias, even though they are not caused by the diplococcus pneumoniæ, inasmuch as it is proper to apply the term pneumonia to any acute infection of the lung. During the past two years local outbreaks of pneumonia have been recorded by Haedke,[1] P. J. Hamilton,[2] and Lop and Monteux.[3] Haedke's paper deals with a house epidemic in which four persons were attacked in succession by severe pneumonia, and all died. The pneumonia was found to be lobular in distribution. Streptococci were found in the lungs, blood, liver, and spleen. In the lungs the bacillus proteus vulgaris was also present. Hamilton's report is upon a series of nine cases occurring in the same neighborhood, while Lop and Monteux describe twenty-five cases of bronchopneumonia occurring in neighboring houses.

Curry[4] has reported the results of his study of twelve cases of pneumonia in which the bacillus capsulatus was found. In only one of three cases did he consider it of pathological significance. In one of these gangrene of the lung developed; one had otitis media, in the pus of which the organism was found in pure culture, while in a third case the bacillus capsulatus was the cause of a complicating endocarditis, although the pneumonia was produced by the micrococcus lanceolatus. Curry found the latter organism to be the sole cause in thirty-two consecutive cases of pneumonia. He claims that the bacillus capsulatus and the micrococcus lanceolatus not uncommonly occur together, but that the micrococcus lanceolatus is frequently overlooked because the former grows more rapidly and inhibits the growth of the latter.

An interesting study upon the vitality and upon the retention of virulence by the micrococcus lanceolatus has been made by Ottolenghi.[5]

---

[1] Deutsche medicinische Wochenschrift, 1898, No. 14.

[2] British Medical Journal, May 20, 1899.

[3] Académie de Médecine de Paris, August 2, 1898; ref. in Münchener medicinische Wochenschrift, September 20, 1898.

[4] Journal of Experimental Medicine, March, 1899.

[5] Centralblatt für Bakteriologie, Parasitenk. und Infectionsk., February 10, 1899.

Sputum was spread upon linen and allowed to dry in diffuse light at a temperature of 15° to 20° C. In the first experiment virulence was lost in thirty-six days; in the second specimen vitality and virulence were retained to an unaltered degree after the lapse of seventy days. In the third specimen virulence was maintained until the sixty-fifth day, while vitality was present for eighty-three days. The bearing of these facts upon the epidemic occurrence of pneumonia and the necessity of careful disinfection of the sputum is obvious.

Temperature-range. One of the most interesting features of the clinical picture of pneumonia is the temperature-chart. In typical cases this is quite as characteristic of the disease as is the temperature-curve of typhoid fever. In the acute, frank cases running a favorable course there is a sharp rise, the continuance of high temperature, and the sudden fall upon the occurrence of crisis. According to present ideas, the rise of temperature in this as in other infections is due to the absorption of toxic material produced by the micro-organisms. It would appear, however, that there is some correspondence between the height of the temperature and the resisting power of the individual. The cases with continual high temperature usually recover, while those with great irregularity of the curve or with less elevation are, other things being equal, more apt to succumb. The variations of the temperature-curve at the end of the disease form an interesting object of study. It cannot be explained why in some cases the temperature rapidly falls to the normal point, with subsidence of all symptoms and a complete immediate change in the clinical picture, while another apparently similar case has a sudden fall of temperature immediately preceding a rise of temperature which ushers in the true crisis. Not only are there peculiarities at the time of the termination of the disease, such as that above mentioned, but there are frequently noticed during the course of some cases curious drops of temperature, sometimes continuing for many hours, to be again followed by a return of pyrexia.

Japha[1] describes the two most peculiar types of intermittence: those with intermittence of the temperature-curve alone and those with intermittence of the temperature-curve and of the disease process. In the second category he places five of his cases which illustrate the course of "wandering pneumonia," one lobe being first attacked and the second becoming involved immediately afterward. Such cases are not unfamiliar and are most disappointing. Why such succession of localizations should occur it is impossible to say. It is a form frequently seen in pneumonia of childhood, even among the cases that in other respects resemble frank lobar pneumonia. Cases of pneumonia with intermitting temperature are less frequently seen, although Japha in his paper has cited eight of these cases in contrast with five of the remitting pneumonias. He gives two possible explanations for the behavior of the temperature: the irregular course of pneumonic infection and mixed infection with other micro-organisms. From the examination of his cases he is inclined to attribute the curious temperature-range to peculiarities of the invasion rather than to mixed infection. In three of his eight cases of intermitting fever in pneumonia the patients were children.

---

[1] Deutsche Archiv für klinische Medecin, 1899, Band lxii.

Seven cases of relapsing pneumonia are reported also. In one of these the patient had been free from fever for thirty hours when the second attack began. His second case was free from all signs of disease for seventeen days, when an angina appeared, which was followed by a rapid rise of temperature, herpes, and a relighting of the signs of pneumonia at the point first affected. This ceased at the end of three days. Examination of the sputum for pneumococci was not made. A rational explanation for this apparent relapse would be a re-infection of the recently insulted lung by micro-organisms absorbed or inhaled from the tonsils. In his third case an interval of sixteen days elapsed before the reappearance of physical signs. His fourth case was a two-year-old child whose temperature fell by lysis, remained subnormal for three days, then suddenly rose to almost its original height, with reappearance of the physical signs, and then fell by steps to the normal. In his fifth case an afebrile period of five days intervened between the primary period of seven days and the relapse which lasted three days. His next case had had repeated attacks of pneumonia. The interval between the primary attack and the relapse occupied eleven days.

Central Pneumonia. Diagnosis. One of the most difficult problems to solve is the certain diagnosis of central pneumonia. From the character of the onset, from the fever-curve, the appearance of the patient, the pulse-respiration ratio, and by exclusion, we may feel convinced that pneumonia is present in spite of the absence of physical signs in the chest. Frequently later in the case, but at times not until crisis has occurred, an area of tubular breathing may be heard, often with the crepitant râles of early resolution. In many cases, however, such outward sign is not vouchsafed, and there may be no sputum, examination of which would throw light upon the subject. In such cases a diagnosis by exclusion is justifiable, but the exclusion must be rigid. Sometimes, in children especially, a spot of impaired resonance with tubular breathing may be present high up in the axillary region, the discovery of which will clear up an otherwise obscure case. In these cases meningeal symptoms seem to occur with rather less frequency than in the more frank cases, yet such a combination is possible. If present, lumbar puncture may be necessary before deciding upon the inflammatory or purely symptomatic nature of the meningeal phenomena.

In the *Revue de Médecine*, May, 1899, Lépine has studied the question of the existence of central pneumonic hepatization, especially by the use of Röntgen rays. He does not believe in the presence of a true central consolidation, but considers that this supposed condition is due to diffuse congestion, and that consolidation is only found at the time when the breath-sounds become changed. Such explanation is hardly satisfactory in view of the fact that every symptom of pneumonia may be present without the appearance of physical signs until possibly late in the course of the case, and may often be more marked before the appearance of dulness and tubular breathing than they are after these signs are available for diagnosis.

Silent Pneumonia. Since the epidemics of influenza which have been hovering about for the last decade the occurrence of what may be called silent pneumonias is frequent. The differential diagnosis between the dull area of silent pneumonia and the area of absent resonance with tubular breathing in what might be termed, in contradistinction, noisy pleural effusion, can usually be made by the difference in resistance to the percussed finger in the two conditions, by the elevation of pitch up to absolute lack of tone on percussing over the pleural effusion, and by the absence of displacement of neighboring organs in pneumonia. In case of doubt the exploring needle may be requisite before coming to a decision.

Complications. ARTHRITIS IN THE COURSE OF PNEUMONIA. This has been frequently observed, as has also inflammation of the bone-marrow; the latter, however, is of sufficient rarity to make noteworthy a paper by Perutz,[1] wherein he reports a case of osteomyelitis of the humerus with inflammation of the shoulder-joint with the Fraenkel-Weichselbaum diplococcus present in the pus. In his case, a boy, eleven months old, catarrhal pneumonia appeared on May 5th, but speedily disappeared. A relapse, however, occurred on June 21st, following which pain was first complained of in the upper arm upon July 6th.

INFLAMMATION OF THE PAROTID GLAND, which is a comparatively frequent complication of typhoid fever, is not often seen in pneumonia. A case of this complication, occurring on the twelfth day and requiring incision and curettage, is reported by Aldridge.[2]

Treatment. The history of the use of PANE'S SERUM IN PNEUMONIA was fully entered into last year in the article on this subject by Dr. Thayer. During the past year Fanoni[3] has reported the use of the serum in six cases. The quantity of serum used varied from 20 to 120 c.c. In the six cases detailed in his report resolution in two occurred on the sixth day by lysis; in two on the seventh day, one by crisis and one by lysis; in one case on the eighth day by lysis; in one on the tenth day by lysis. The author concludes from these six cases that this serum is the rational remedy for pneumonia; that the injections are not painful, and are not followed by disagreeable after-effects; that it will do no harm, even if given in doses of 100 to 150 c.c. in twenty-four hours; that the serum in all of his cases showed wonderful efficacy and produced rapid improvement.

---

[1] Münchener medicinische Wochenschrift, January 18, 1899.

[2] Medical News, November, 1898.

[3] New York Medical Journal, August 26, 1899.

Fanoni's last conclusion seems rather sweeping: that in lobar pneumonia, especially if the prognosis is grave, it is the duty of the physician to use this serum, and he is culpable if he allows his patient to die without it. It would seem that such a statement is far too radical with the experience at present at hand in regard to the value of this serum. In no disease more than in pneumonia must care be exercised in drawing conclusions as to the results from any form of treatment. Anyone connected with a large hospital service must have frequently seen cases brought in on the seventh or eighth day of an attack of croupous pneumonia, which, without any treatment or even in spite of previous gross neglect, may have their crises occur possibly within a few hours after their admission to the hospital. In estimating the results in the treatment of pneumonia it is almost impossible to avoid error, because in two given series of cases the vitality of the patients, their ability to manufacture their own antitoxin, the ability to rid the system of toxins, and the ability of the various organs to withstand the strain of the acute illness cannot be compared. From the six cases in the paper quoted above but little can be adduced in favor of this plan of treatment that could not with equal propriety be brought forward in support of many other plans. It cannot be said that we have up to the present time any specific method of treatment of acute croupous pneumonia. The method of Pane may ultimately prove to be the rational and proper method of treating this disease, but it will require far more extended observations than are at present available to firmly establish its character as a specific remedy. That in time an efficient antitoxin will be found seems a rational hope. Meantime, until definite proof exists that we can cut short the disease or avert death by one of the serums at present advocated, we must treat the patient symptomatically. During the past year this serum has been experimentally tested on rabbits by Eyre and Washbourn,[1] with confirmation of the claim made by its originator.

---

[1] Lancet, April 8, 1899.

INFLUENZA.

While the literature of influenza was tremendously increased during the early years after the outbreak of the epidemic beginning in 1889, but little of interest has been added during the last two years. A few articles have appeared, however, which are worthy of notice. Most of these, as would be expected, deal solely with the sequelæ of the disease.

Varieties, Sequelæ and Complications. Marquie[1] has reported seven cases of what he calls the SUDORAL FORM OF INFLUENZA, which he says has only been described previously by Jaccoud. This form is characterized by profuse sweating at intervals, not accompanied by rise of temperature or preceded by a sense of heat. The sweating is followed by a feeling of relief, although as it subsides the bronchial catarrh seems to increase, while, conversely, the latter is apt to lessen as sweating comes on. Sudamina are sometimes present. The duration of this form of influenza is said to be long, and convalescence is protracted for months in some cases. The points of difference between this form of influenza and the sweating sickness of miliary fever, as regards their course, duration, and termination, are given.

Pelon[2] has reported three cases of LENTICULAR ROSE SPOTS resembling those characteristic of typhoid fever, other symptoms in the case being quite like those of the latter disease. In all three cases the agglutination test was negative. In one of the cases the eruption is distinctly stated to have appeared in crops. The author lays stress upon the fact that these rose spots are most apt to appear in the typhoid form of the disease. In the same journal Feindel and Froussard[3] report a similar eruption, having many of the prodromal symptoms of typhoid fever, including cephalalgia, malaise, epistaxis, and fever. The Widal test was negative both during the course of the disease and at the beginning of defervescence. Although the authors state their belief that this was a case of grippe, there is much in the history to indicate that it was an example of typhoid fever with absence of the Widal reaction.

The system that probably more than any other feels the stress in influenza is that of the CIRCULATION. Like other infections, influenza plays a rôle in the production of changes in the vessel-walls which may lead to further and lasting degeneration. Syphilis is the infection to which attention is most strongly drawn in considering the vascular degenerations, and undoubtedly it is *par excellence* the infection most frequently influential in producing these conditions. Most of the infections occur early in life, at a time when degeneration takes place only with difficulty. Syphilis, however, although contracted as a rule in early middle life, produces its effects slowly and insidiously, so that we may see the influence of its toxins long after the primary sore and at a time when degeneration is produced with ease. The two frequent acute infections that occur toward the period of beginning decline of the tissues are typhoid fever and influenza. The former of these is infrequent after the age of forty years, the latter attacks all ages indiscriminately. It is, therefore, reasonable to suppose that of all the infections, save syphilis, influenza is the one most capable, or, rather, most active, in producing arterial degeneration.

---

[1] Journal de Médecine de Bordeaux, February 6, 1899.

[2] Gazette des Hôpitaux, April 21, 1898.

[3] Ibid., June 2, 1898.

It is possibly owing to this fact that the beginning of a decline of vital activity may be directly referable to an attack of this disease occurring in a person previously still upon the upward slope of life.

The marked effect of the influenza toxin upon the heart during the attack and immediately after its subsidence, and the permanent cardiac disability, often of a progressive nature, left behind after apparent complete recovery, are the subjects of frequent comment, and have been noted since the first of the epidemic recurrences that since the year 1889 have been witnessed in all parts of the world.

Certain features of the epidemics of influenza are not thoroughly developed until some years after the first attack. In the case of cardiac lesions following influenza this is notably true. It is, therefore, a matter of interest to now read such a paper as Sansom's Hunterian Oration for 1899.[1] Sansom insists upon the rarity of endocarditis as a result of influenza. Such an occurrence must be rare, yet of the two conditions —endocarditis and myocardial degeneration—the latter is of far more serious consequence than the former. It is important to bear this fact of the rarity of influenzal endocarditis in mind, inasmuch as the occurrence of, for instance, an apical systolic murmur during or shortly after an attack of influenza, means that there has taken place degenerative change in the myocardium that tends to be progressive and is compensated only with difficulty, and does not mean, as in rheumatism, an inflammatory change in the mitral leaflets which can subside and to combat which compensatory hypertrophy can usually occur.

Upon the vascular system the influenza toxin has a marked effect aside from its capacity for producing degenerative changes mentioned above, and it is possible that in this abnormal state of vascular tension, or, rather, of vascular tone, we should seek for an explanation of the tachycardia, the bradycardia, and the irregular cardiac action following influenza, although Sansom lays but little stress upon this point, and rather blames the vagus and its centres for the rapid heart. The occurrence of the syndrome described by Graves and Basedow after influenza cannot be attributed to alterations of vasomotor nerves or centres alone, and we must conclude that the tachycardia of influenza, with or without the other members of the symptom-group of Graves' disease, may be produced by an action upon the nerve-centres by the influenza toxin similar to that exerted by hyperthyroidism, or whatever other factor may be the cause of Graves' disease seen without the presence of this infection. Curiously enough, the opposite condition—bradycardia—is also seen after influenza. This I have frequently noticed during even the stage of fever in influenza, and it is, as is well known, a frequent sequel of the disease. Sansom notes one case wherein the rate was only nineteen per minute—far less than any that I have happened to see. It would have been interesting to have heard from such an authority as Sansom a possible explanation for this condition. None of those heretofore given are satisfactory, and we have still to fall back upon the vague statement that the condition is due to lack of adjustment of the nervous mechanism controlling the cardiac activity.

---

[1] Lancet, October 21, 1899, p. 1075.

The attacks of anginoid pain following influenza, which are in many cases indistinguishable from true angina pectoris, are attributed by Sansom to acute aortitis, the lesions of which were found in one of his fatal cases. This frequency of angina-like pain after influenza and the occurrence of acute aortitis as a result of the infection, together furnish corroborative evidence of the theory, especially advocated by T. Clifford Allbutt, that the pain of angina pectoris is aortic, and not cardiac or neural in origin.

Weisbach[1] has summarized the literature in regard to the presence of ICTERUS DURING INFLUENZA, and has reported the case of a patient who, following a chronic otitis media which was intensified by the outbreak of the disease, some days after relief from the symptoms of influenza showed signs of severe nervous disturbance, leading to coma and accompanied by the development of icterus. Death soon followed, and at autopsy there were found, besides a fresh catarrhal and influenzal pneumonia, degeneration changes in the organs but no evidence of obstruction to the outflow of bile.

Lemoine[2] distinguishes three forms of INFLUENZAL SPLENOPNEUMONIA. In the first of these there is abolition of vocal resonance and tactile fremitus, with impaired resonance, complete absence of breath-sounds, and râles; it begins with pain in the side and is accompanied by fever, but without expectoration during the first part of the illness. This group of physical signs is still occasionally seen in cases which must be looked upon as true croupous pneumonia occurring independently of influenzal poison, although usually in the cases observed since the subsidence of the epidemic, rusty expectoration is often noted early in the attack The second division is described as passive congestion with splenization, accompanied by fever. Impaired resonance, with increase of fremitus and absence of râles and breath-sounds, are the physical signs characterizing it. Fever and intense dyspnœa are present, and hæmoptysis frequently occurs. With this form cardiac irregularity or impairment is frequent, as though the nerves of the heart were affected by some toxic material. Lemoine speaks of the third division as passive congestion with splenization, but with a tendency to chronicity and with absence of fever. In the area involved there is slight impairment of the percussion note, increased vocal resonance and diminished breath-sounds without râles. While ordinarily occurring at the bases, it may be present at the apices, and is then difficult to distinguish from tuberculosis. Lemoine's article is chiefly of interest because it will be realized by everyone how the type of croupous pneumonia has changed since the outbreak of the epidemic of influenza, and how frequently cases are now seen which in many ways pursue the course of a croupous pneumonia of ordinary type except in the curious medley of physical signs.

---

[1] Allgemeine medicinische Zeitschrift, April 5, 1898.

[2] Bulletin Médicale, April 24, 1898.

SPASTIC SPINAL PARALYSIS FOLLOWING INFLUENZA. During the past year Michaelis[1] has reported a case, and has collected from the literature five cases of myelitis following influenza.

J. Dreschfeld[2] has contributed an excellent article upon the NERVOUS SEQUELÆ of the disease. As would be expected, he found among the most common of the nervous sequels neurasthenia of the cerebro-spinal, spinal, and sympathetic type. Melancholia with suicidal tendency was seen by him in three cases of young females, in only one of whom was there any tendency to mental disease. Under the neurasthenia of sympathetic type he speaks of bradycardia, syncope, attacks of angina pectoris, and exophthalmic goitre. The frequency of neuralgia, migraine, hyperæsthesia, and anæsthesia of influenza is also spoken of. Peripheral neuritis after influenza has been frequently noted. Its occurrence upon both limbs of the same side has been seen by Dreschfeld in several cases. A form of neuritis resembling that occurring in diphtheria, with paresis of accommodation, and in some cases palsy of the pharynx and larynx, has been noted, although it is possible that these palsies are due to nuclear trouble rather than to peripheral neuritis. Dreschfeld states that cerebro-spinal meningitis running an acute course is not usual, but that chronic systemic disease of the spinal cord is not likely to be caused by influenza, although its course may be hastened or its onset determined by this disease. He speaks of the comatose and maniacal form of the acute attack, to which attention was repeatedly called by various authors shortly after the outbreak of the epidemic. Under the pathology of the affections of the nervous system in influenza he speaks of simple cerebral hyperæmia, purulent meningitis due to the presence of the influenza bacillus upon the membranes, and of hemorrhagic exudation, and records a case of extensive cerebral hemorrhage following influenza in a patient twenty-one years old. The occasional occurrence of cerebral abscess without discoverable primary focus is spoken of in addition to abscesses resulting from otitis media and extension from the ethmoidal sinuses. The cases of mental disorder following influenza are divided into four groups: melancholia (the largest group), acute mania, and two other forms resembling ordinary dementias. Among the latter he believes influenza plays only a small part—by lowering the general health. His conclusions in regard to these mental sequelæ are as follows: In many cases no family predisposition is to be noticed. Many of them occur in young people and even in children. In most of the cases there was present after recovery from influenza continued sleeplessness and depression preceding the more acute mental symptoms. Many of the cases recovered after a short period. Of five cases of post-influenzal mania admitted to the Cheadle Asylum four completely recovered and the other was relieved, but the symptoms resembled those of general paralysis. Of nine patients with post-influenzal melancholia five recovered; one died of phthisis; two were still in the asylum, and one was discharged without relief. Two cases of general paralysis were admitted, the nervous disease being supposed to follow an attack of influenza. Of two cases of post-influenzal dementia one had a strong family tendency to mental disorder and one had been an alcoholic. In one case senile dementia seemed to follow influenza.

---

[1] Deutsche medicinische Wochenschrift, February 16, 1899.

[2] Manchester Medical Chronicle, March, 1899.

CEREBRO-SPINAL FEVER.

During the past few years there has been present in the United States a wide-spread epidemic of cerebro-spinal fever. The epidemic described by Councilman, Mallory, and Wright, which was noted last year in Progressive Medicine, is the most extensive as well as the one best studied of any reports so far at hand.

Etiology and Diagnosis. In the diagnosis of this disease there is probably no one measure of more value than lumbar puncture, the employment of which in the epidemic above referred to has been the subject of a special report by Wentworth. Inasmuch as this measure has but recently been employed, and as reports upon its use in various diseases would receive notice in no other place more appropriately than in the present article, a few points will be referred to which have only an indirect bearing upon cerebro-spinal fever.

It is probable that further study will make this procedure of more value in the differential diagnosis of various conditions of the central nervous system, but at the present time it must be confessed that diagnosis by lumbar puncture is frequently attained either by exclusion of possible conditions or by placing the case under consideration in a certain class of affections of the central nervous system. Bacteriological examination of the material obtained by lumbar puncture may, however, render certain an otherwise doubtful diagnosis. The discovery of the Jaeger-Weichselbaum meningococcus intracellularis in the material obtained is a positive proof of the existence of cerebro-spinal meningitis of epidemic type. Occasionally, however, in spite of every care in carrying out the technique, fluid may not be obtained by lumbar puncture. In one case of cerebro-spinal fever, where I was much disappointed in obtaining no fluid on performing lumbar puncture shortly before the death of the patient, my failure was explained at autopsy by the thick, wax-like exudate without excessive cerebro-spinal fluid within the brain and spinal cord or their membranes. While I am willing to agree that in most cases failure to obtain fluid in some quantity is due to faulty technique, in the case above mentioned such an explanation would not hold in view of the post-mortem findings.

Pfaundler[1] has performed nearly 200 lumbar punctures in the last five years. His results, therefore, are of interest. He uses the lumbo-sacral space instead of the interval between two lumbar vertebræ, and performs the operation in the sitting posture. He states that extraordinarily high pressure appears almost exclusively in tuberculous meningitis. In one such case he found the pressure to equal 110 mm. of mercury. High pressure was also found present in purulent meningitis, in tumors, and in many functional neuroses. Normal pressure excludes the presence of a meningeal or cerebral affection. If the fluid is blood-tinged and the blood freshly poured out it is due to the puncture. In the case of children, if the blood is disintegrated there is almost always pachymeningitis or trauma. Pfaundler states positively that with clear fluid every inflammatory affection in the meninges, except tuberculosis, is excluded. In this disease in the first stage one-half of the cases show it to be cloudy, while in the last stage turbidity is present in two-thirds of all the cases. Purulent fluid always means purulent or epidemic meningitis. Clear fluid occurs in health, in serous meningitis, hydrocephalus, and functional neuroses, while it is usually so in tumors, uræmia, and sepsis. The same author gives the normal amount of albumin present as 0.02 to 0.04 per cent., while an amount of more than 0.05 per cent. (in the absence of blood) is present only in tumors and in inflammatory diseases. A higher albumin percentage than that last mentioned in clear fluid almost certainly means tuberculous meningitis. The albumin curve of tuberculous meningitis rises from the beginning of the disease up to death. Pfaundler states that in inflammatory diseases the sugar disappears, and that if this constituent is present it means either a normal condition or the absence of an acute inflammatory affection. The specific gravity, the reaction, and the amount of fluid obtained have no special significance, but a great quantity of fluid is usually present in tuberculous meningitis. He recommends direct examination of cover-slip preparations or examination after the use of a centrifuge, and states that he has found bacilli in this way in 91 per cent. of his cases where they were present. In epidemic cerebro-spinal meningitis the Weichselbaum-Jaeger bacilli were readily found in great numbers, and in many cases of athrepsia he found cocci.

---

[1] Jahrbuch für Kinderheilkunde, Band xlix., Heft 2 and 3.

In regard to the therapeutic value of lumbar puncture Pfaundler found that where pressure was high good palliative results were obtained, and that it was indicated in epidemic cerebro-spinal fever and in hydrocephalus. Among his 200 punctures he saw no bad results, although in one case collapse occurred after removing a large amount of fluid.

KERNIG'S SIGN. Another sign which is of value in the diagnosis of cerebro-spinal meningitis is that of Kernig. As in lumbar puncture, so in regard to this sign, mention is made of it in this place, although it has a wider application than its position in this article might indicate. It has recently happened in my own experience that in three cases of tuberculous meningitis, one of purulent leptomeningitis, and one of cerebro-spinal meningitis occurring in infancy (all below the age of two years), Kernig's sign, although repeatedly sought for, was persistently absent in all. The diagnosis in the tuberculous cases and in the one of lepto-meningitis was confirmed at autopsy. Whether the sign is always absent in infants with meningitis I cannot say from my own experience or from any statements made in the literature that have come under my notice, but it is mentioned here in order to call attention to the fact that a too hasty discarding of the diagnosis of cerebro-spinal meningitis in infants might be occasioned by its absence. It is also spoken of in the hope that others may either confirm its frequent absence in infants with meningitis or may find that it was simply coincidence that caused this absence in the only cases of meningitis in infants under two years that have recently come under my notice.

Herrick,[1] in an excellent article upon Kernig's sign in meningitis, gives a *résumé* of the history of the sign and of its diagnostic significance. Herrick's article is based upon the observation of 19 cases, in 8 of which autopsy was performed. Nine of these were cases of epidemic cerebro-spinal meningitis, 7 tuberculous meningitis, 2 pneumococcic, and 1 syphilitic meningitis. The sign was present in 17 (89.4 per cent.), and in the 2 cases in which it was absent the examination was made a short time before death, when there was general laxity of all the muscles. In 25 healthy individuals the phenomena described by Kernig were absent in all. In 100 cases other than meningitis the sign was absent in 98 and present in 2. These two cases included one of subdural hemorrhage and one of gonorrhœal rheumatism, in the latter of which the habitual posture had been one with extreme flexion of the knees.

---

[1] American Journal of the Medical Sciences, July, 1899.

In two cases of epidemic cerebro-spinal meningitis a sign probably closely allied to that of Kernig was noticed by me among a group of cases at the Pennsylvania Hospital during last spring. In both cases the arms were ordinarily held flexed at the elbow, the hands resting on the chest. In both an attempt to straighten the contractured joints was accompanied by intense pain so soon as the biceps tendon could be felt to become tense under the skin. There was no sign of trouble in the joints in either case, and the site of pain was described in both cases as being high up on the biceps tendon or in the belly of the biceps itself. In a few other cases, admitted after this phenomenon was noticed, a similar sign could not be elicited, although in these, it should be said, there was absence of rigid flexion at the elbows.

Schiff[1] found the meningococcus intracellularis seven times in the nose of twenty-seven people, whose nose was either normal or in a condition of chronic catarrh; and Carl Fraenkel[2] found in three cases of membranous conjunctivitis small diplococci within the leucocytes showing the cultural characteristics of the Weichselbaum-Jaeger bacillus.

Hünermann[3] states that the bacteria in cerebro-spinal meningitis are found only with difficulty in cover-glass preparations; that in some cases bacteria are found similar to the micrococcus intracellularis, and in some a small bacillus resembling the influenza bacillus, but being slightly larger. The cultures are not similar to the Weichselbaum-Jaeger bacillus, but are like the staphylococcus pyogenes aureus, liquefying gelatin, and forming a grayish-white or yellow colony on glycerin-agar. He says also that staphylococci may frequently be found in pus-cells, but have all the characteristics of the staphylococcus pyogenes aureus. In two animal experiments meningitis was produced by subdural injection of cocci found in epidemic cases of cerebro-spinal meningitis. The meningococcus intracellularis has been found by Hünermann in cases of tuberculous meningitis and in non-epidemic traumatic meningitis, and he doubts whether it is a special form of micro-organism.

---

[1] Centralblatt für innere Medecin, 1898, No. 22.

[2] Zeitschrift für Hygiene und Infectionsk., Band xxxi., Heft 2.

[3] Zeitschrift für klinische Medecin, Band xxxv., Heft 5 and 6.

Netter[1] has reported a case of cerebro-spinal meningitis in which the diagnosis was made by the history of the onset, elevation of temperature, pain in the head and body, stiffness of the neck and the presence of Kernig's sign. There was no paralysis or contracture, nor was there any trace of herpes. There was no sign of disease of the organs in the chest, nor was there otitis. Lumbar puncture furnished a somewhat clear liquid, escaping freely and containing more albumin than would be found in the normal fluid. The patient died in coma, and there were found the lesions of purulent spinal meningitis. Examination of the ears and of the sinuses showed no evidence of disease. The lungs were normal except for slight congestion posteriorly, and none of the organs presented any pathological condition. The case occurred during a mild epidemic of cerebro-spinal meningitis. Netter draws attention to the difficulty of judging of the condition of the liquid contained within the spinal canal by the appearance of the liquid obtained by puncture, as was illustrated by his case and by one of mine. In Netter's case, in the fluid obtained by lumbar puncture, typical encapsulated lanceolate organisms, pathogenic to mice and showing on human blood-serum a growth of cocci or of capsulated lanceolate diplococci, were present. Netter considers that the diplococcus intracellularis of Weichselbaum has nothing in common with the organisms causing the great majority of meningitis cases in the small epidemic in Paris.

There is, however, strong evidence in favor of the peculiar etiological relation of the meningococcus intracellularis to epidemic cerebro-spinal meningitis. That other micro-organisms may gain access to the cerebro-spinal meninges and produce a symptom-complex resembling that of the epidemic form of the disease does not invalidate the claim that the meningococcus is the specific cause of "spotted fever." The finding of other organisms in the exudate of cerebro-spinal meningitis has been recorded during the past two years, but these cases do not prove the non-specific character of the organism described by Jaeger and Weichselbaum.

Cassel[2] mentions two cases of children in whom lumbar puncture was performed. Both were suffering from cerebro-spinal meningitis. In one of them the meningococcus intracellularis, in the other Friedlander's pneumococcus, were found in the fluid obtained.

---

[1] Bulletin et Mémoires de la Société Médicale des Hôpitaux, January 12, 1899.

[2] Jahrbuch fur Kinderheilkunde, Band xlvii., Heft 1.

Asimis[1] has observed sixteen cases of epidemic cerebro-spinal meningitis, of whom ten recovered and six died. In the two cases upon which autopsies were performed he found a diplococcus, which he states differed from that described by Weichselbaum.

The epidemic of cerebro-spinal fever which occurred in so many of the large cities of the United States during the past year was also present in Baltimore, and the results of the study of these cases are given in Osler's Cavendish Lecture upon its etiology and diagnosis. In sixteen of the twenty-one cases observed lumbar puncture was performed. In two of these no organism was discovered. Among the remaining fourteen cases the diplococcus intracellularis was found on cover-slips and in cultures in thirteen. Five cases came to autopsy. In one of these meningitis due to the meningococcus and pneumonia due to the pneumococcus were found. In another the diplococcus intracellularis had been found during life in the blood and from the tissues of the inflamed joints. At autopsy the meningococcus was present in pure culture in the exudate of the brain and cord; the pneumococcus grew in cultures from the lung and the blood in the coronary arteries. Another case had had laminectomy performed two months before death. At the operation the staphylococcus pyogenes had been obtained by culture, but at autopsy the spinal meninges were found normal. In another case in which laminectomy had been performed the meningococcus was isolated from the meninges both at operation and at autopsy. In a case dying in the twelfth week (from the spinal fluid, of which the meningococcus had been obtained during life on two occasions) cultures from the meninges at autopsy gave streptococcus pyogenes and the bacillus coli communis. Osler emphatically states his belief that epidemic cerebro-spinal meningitis is due to a specific micro-organism. Among the twenty-one cases observed thirteen had some form of skin eruption, herpes being present in eight, petechiæ in the same number, while in four a diffuse erythema about the chest, abdomen, and joints was present, and in three cases a remarkable and peculiar rash, described as a diffuse, livid erythema, with purpuric herpes, was observed. In a case seen by me during the past spring, at the time when many cases of cerebro-spinal meningitis were occurring throughout the city and being admitted to the wards of the Pennsylvania Hospital, a case of pleurisy with effusion was admitted. Capsulated diplococci (not within the cells) were found in the aspirated fluid. Within the next two weeks purpuric herpes similar to those described by Dr. Osler appeared about the elbows and ankles, these joints being painful and swollen. There was at no time evidence of either cerebral or spinal meningitis. The case died, manifestly from toxæmia, but unfortunately no autopsy was allowed. From the contents of the purpuric vesicles diplococci similar to those in the pleural exudate were found, again not enclosed in the leucocytes. The case is merely mentioned because of the occurrence of this curious eruption closely resembling those seen by Dr. Osler in a fair number of cases out of a series of epidemic cerebro-spinal meningitis, and at a time when that disease was prevalent throughout this city. Unfortunately, cultures were not obtained. In every instance among Dr. Osler's cases leucocytosis was present in greater or less degree. The maximum count was 47,000 per c.cm. The diplococcus intracellularis was isolated from the blood of one case during life. Kernig's sign was present in all of the cases in which it was looked for.

---

[1] La Presse Médicale, May, 1898.

A full discussion upon the occurrence of sporadic cases of cerebro-spinal fever, with illustrative cases, is given, showing what has been before observed, that this condition is by no means infrequent in the large cities of the United States. One of the patients observed by Dr. Osler had laminectomy with spinal irrigation performed upon him without evident benefit, unless we consider the fact that two months later autopsy showed that the spinal meninges were smooth and apparently normal, may be an indication that some relief was afforded. In another patient laminectomy with spinal irrigation was performed; the patient seemed better for several days, but died on the sixth day after operation from hemorrhagic cystitis and pyelonephritis.

Treatment. LUMBAR PUNCTURE. The absence of bad result after carefully performed lumbar puncture for diagnostic purposes, which Wentworth has shown particularly, has led to the hope that the procedure might be of therapeutic value. Several cases have been reported in which good results seem to have followed, yet in such diseases as cerebro-spinal fever, where we are particularly apt to have casual remission of symptoms and of signs, great care is necessary before drawing conclusions as to the value of any one remedial measure. A striking example of this has just occurred in the wards of the Children's Hospital of Philadelphia, where a child admitted for meningitis, presumably of the epidemic cerebro-spinal form, was seriously ill until the afternoon following lumbar puncture. Save for the obtaining of a few drops of clear fluid, which was perfectly sterile on culture, the operation was void of immediate result. On that afternoon the temperature rapidly fell, and since that time (three weeks before the present writing) the child has completely recovered. Had fluid been obtained in a quantity sufficient to have had any possible favorable result, I fear that the rapid improvement would have been attributed to the operative procedure. It is reasonable to presume that the removal from the spinal canal of an inflammatory exudate containing the specific organisms of the disease in large number must have a favorable effect on the course of the disease.

Rolleston and Allingham[1] have reported a case of epidemic spinal meningitis with marked trophic and vasomotor disturbances. The case was growing progressively more serious when an operation was determined upon. An incision six inches long was made over the lower dorsal spines, and the lamina of the seventh and eighth dorsal vertebræ were removed. The dura was seen to bulge, and was excised for about an inch in its long axis. Coagulated lymph and cerebro-spinal fluid to an amount equal to three ounces escaped. A drainage-tube was inserted and the dura was left unclosed. Marked improvement was noted two days later, but the healing of the wound caused a return of the symptoms. Free drainage was again established, and improvement again occurred. Thirty-four days after the beginning of the illness the temperature had reached the normal point and the discharge from the wound had ceased. In their article the authors mention a case reported by Ballance,[2] in which the occipital bone was trephined and the subarachnoid space drained in a case of chronic non-tuberculous meningitis in an infant. The results obtained in Osler's cases should also be remembered in this connection.

UNGUENTUM CREDÉ. The use of silver as an antiseptic was first described by Credé,[3] who has prepared an ointment, the dose of which for an adult is 3 grammes, for a half-grown person 2 grammes, and for a child 1 gramme, the salve being rubbed in thoroughly for fifteen or thirty minutes in the evening. In the literature there have appeared occasional favorable notices of the use of this ointment (unguentum Credé) in various septic diseases, especially those of the puerperium.

Gustav Schirmer[4] has reported nine cases of epidemic cerebro-spinal meningitis in which he has used unguentum Credé with good results. These cases were of varying degrees of gravity.

In May, 1899, there entered the Pennsylvania Hospital under my care a schoolboy, aged fourteen years, who had complained at times of severe headache for the past two weeks. Two days before admission he vomited, had shooting pains in the head, went to bed, and in four days became delirious. He was exceedingly nervous, but had no convulsions. On admission to the ward he had marked internal strabismus, with stiffness of the neck and retraction of the head, varying from day to day. The examination of the eye-grounds was negative. His temperature pursued a quite irregular course, and from day to day his condition varied decidedly without definite progress in either direction except for increasing deafness, and it was thought that some more active treatment should be instituted, if that were possible. Remembering Schirmer's article, I ordered a drachm of unguentum Credé, to be used by inunction three times daily. His temperature, which had previously been above normal for at least the greater part of every day, remained below the normal point for five days, although the use of the ointment had been stopped on the third day after we began its employment. On June 30th his temperature began again to rise irregularly, and the ointment was renewed. The temperature for the next two days was lower than it had been for four days preceding. Owing to a curious redness and spongy condition of the gums the ointment was then stopped. On the day after it was stopped the temperature rose to 103.3° F., and the ointment was again used. The temperature rapidly fell to the normal point after two days, and stayed down afterwards, with the occasional exception of a trifling rise, apparently due to constipation. Recovery was complete except for the presence of a considerable degree of deafness, probably from involvement of the eighth nerve.

---

[1] Lancet, April 1, 1899.

[2] British Medical Journal, 1897.

[3] Archiv für klinische Chirurgie, 1897, Band l. p. 861.

[4] New Yorker medicinische Monatschrift, November 1898.

In another case, a little girl who was admitted the same month, the action of the ointment seemed to be prompt and decidedly favorable. That the improvement in the symptoms and signs following each three days' course of inunctions was simply a coincidence, such as might readily happen in a disease so uncertain as epidemic cerebro-spinal meningitis, cannot be denied. Nevertheless, the improvement after each treatment was so marked that I should certainly give the method a further trial. How the ointment acts we do not know, nor can we reason out its physiological action. However, the same thing can be said of mercurial inunction, which certainly has the power of causing absorption of inflammatory exudate, even though it be not of specific origin.

The same treatment has been reported as of value in several cases of cerebro-spinal meningitis by Dixon.[1]

Antistreptococcic Serum has been employed by Charles P. McNab[2] in two cases of cerebro-spinal meningitis. In the first case 10 c.c. of antistreptococcic serum were given on the fifth day and again twice on the sixth day. After that slow convalescence ensued. The second case was given 10 c.c. of serum on the second day of his illness, and the next day he was decidedly better, but another injection of 10 c.c. was administered in the morning and again in the evening. After the appearance of coma and unequal pupils with opisthotonos the patient died. It is difficult to see in exactly what manner antistreptococcic serum could be of value in a disease not produced by the action of streptococcus. The author considers that the serum has a stimulant effect on the nerve centres in cases of coma, just as would a warm saline injection; that it probably increases phagocytosis and usually has some antidotal effect on the diplococcus intracellularis, and that it probably prevents purulent infection of the exudate and thus lessens the danger in cases surviving the first three or four days.

---

[1] Journal of American Medical Association, May 27, 1899.

[2] New York Medical Journal, February 25, 1899.

SCARLET FEVER.

Etiology. The chief interest of scarlet fever at the present time is the question of its etiology. But little has been contributed during the past year except for the articles which are mentioned below.

While there is a wide-spread feeling that scarlatina is caused by a streptococcus, there is no real ground for such a belief. It has probably arisen by the resemblance between scarlatina and the various forms of sepsis. That the throat is the portal of entry of the poison is rendered likely from the early appearance of abnormal signs in that locality; nevertheless, we do not know that the erythema of the throat is not a simple exanthem or enanthem. Analogy would point to the throat as the most accessible place for infection, yet too much significance should not be attached to the finding of streptococci upon the throat of patients with scarlatina, since that organism is so constantly present in the healthy mouth. The discovery of streptococci in the exudates present as complications is not definite proof of the etiological importance of this organism, inasmuch as it might readily be due to a secondary infection. Possibly the use of the term "surgical scarlatina"—an eruption occasionally seen in surgical cases and probably due to the vasomotor effect of toxins absorbed from a wound infected by streptococci or by the causes of scarlatina—has had much to do with strengthening the belief in the streptococcic origin of the specific disease. That "surgical scarlatina" bears a close resemblance to scarlatina is undoubted, but there is no proof that there is any but a superficial relation between the two diseases.

Class[1] has endeavored to discover the causative agent in scarlatina. He used a culture medium composed of glycerin-agar to which had been added 5 per cent. by weight of black garden earth which had been previously sterilized by discontinuous heating. By this means he obtained a growth of a diplococcus somewhat resembling a large gonococcus. It was biscuit-shaped, with a transverse line running through each half of the organism. The size varied considerably, but was usually larger than the ordinary pus microbes. Lancet-shaped forms, such as are seen in the pneumococcus, were never observed, but cocci, single and in chains, were found occasionally. They were not encapsulated and showed no spore-formation. They stained with watery solutions of methylene-blue, fuchsin or bismarck brown, and were decolorized by Gram's method. The materials for cultivation were obtained from the scales, and the tubes were kept in the incubator at a temperature of 35° C. In the space of from forty-eight hours to one week grayish-white, transparent colonies appeared along the track of inoculation and around the scale. Ordinary media showed no growth, although in milk the germs were found to multiply. It is not pathogenic to rabbits or guinea-pigs, either by subcutaneous injection, scarification, or intra-abdominal injection. The results obtained by Class were based upon the examination of thirty typical cases. The confirmation or refutation of his conclusions will be looked for with interest.

---

[1] Chicago Medical Record, May, 1899.

Klein[1] claims that the streptococcus conglomeratus is the cause of scarlatina. He says that it is never present in angina which is not of scarlatinal origin. In nine out of eleven cases he found the streptococcus conglomeratus in the throat and nose of patients who had had scarlet fever, one after the lapse of seven months. So confident is he in his view that in one case he made the diagnosis of scarlet fever from the presence of the streptococcus conglomeratus from the throat of a girl, who recovered in two days. Three days later four other persons in the same house developed scarlet fever.

Pathology. During the past year an important article on the pathology of scarlet fever has been contributed by R. M. Pearce[2] as the result of twenty-three autopsies in cases of this disease. He concludes that no light can be thrown by post-mortem examinations upon the etiology of the disease. The only constant gross lesion was a hyperplasia of the lymphoid tissue in every part of the body. Secondary inflammatory lesions were found to be produced by streptococci, staphylococci, and pneumococci, in the order named. As would be judged from the clinical examination of cases of scarlet fever, the more important complications met with at autopsy were, in the order of their frequency, bronchopneumonia, otitis media, cervical adenitis, acute pleurisy, and inflammation of the antrum of Highmore. In a large percentage of cases the middle ear, the antrum, and the sphenoidal sinuses were infected. Of the visceral lesions acute interstitial nephritis ranked first. Lesions of the glomeruli were found to occur late in convalescence.

J. H. McCollum[3] has reported upon 1000 cases of scarlet fever occurring in the isolation department of the Boston City Hospital. The mortality of the 1000 cases was 9.8 per cent. The intensity of the infection seemed alone to cause death in 56 cases, while bronchopneumonia was the cause of death in 15. The writer of the article considers that nephritis, pneumonia, bronchopneumonia, pericarditis, endocarditis, dilatation of the heart, otitis media, and any streptococcus infection are in reality parts of the disease rather than complications. While, as has been said, we have some ground for believing that a streptococcus is the cause of scarlet fever, our chief reason for believing this to be the case is the almost constant presence of this organism in the local lesions present in this disease. While the view advanced by McCollum may be correct, it has never been proven directly that the streptococcus is capable of producing scarlet fever. It is exactly such papers as the one quoted that cause us to consider the possibility of streptococcus as the etiological factor while we are waiting for the discovery of a possible organism of more specific significance.

---

[1] Twenty-seventh Annual Report of the Local Government Board of London, 1898.

[2] Boston City Hospital Reports, 1899.

[3] Ibid.

In the paper above mentioned McCollum makes the statement that the appearance of a punctate eruption in the armpits and groins, together with congestion of the tonsils and a punctate eruption of the roof of the mouth, are positive proofs of the existence of scarlet fever, even if there be no eruption elsewhere on the body. He also draws attention to enlargement of the papillæ of the tongue as one of the most characteristic features of the disease, and states that it was the only constant sign in his 1000 cases. Probably to everyone there has occurred the difficulty of giving a positive opinion as to the possible prior existence of scarlet fever in a patient who has had an acute illness, but is seen only during a period of desquamation. McCollum states that the existence of a white line at the junction of the pulp of the finger with the nail is a valuable evidence of the previous existence of scarlet fever. It would be of interest to note whether such a white line has been seen in cases of so-called surgical scarlet fever, which frequently occur in the surgical wards of every children's hospital. If this sign is only present in true scarlet fever and is absent in cases of septic erythema simulating that disease, it would be of value in differential diagnosis.

MEASLES.

Etiology. During the past year but little new has been added to our knowledge of measles. A few articles, however, bearing upon this disease should be mentioned. The etiology is still obscure, although a considerable amount of work has been done to determine it within the past few years.

The search after a specific micro-organism as the causative factor has been unsuccessful. That measles is produced by a living infectious germ cannot be doubted, and probably this will be discovered within a not very long time. The difficulty in judging as to the primary or secondary nature of an infectious agent found in the acute infections of the class of eruptive fevers is partly because animal experimentation gives us no help, as the lower animals are apparently immune to most of the eruptive fevers, including measles.

G. Arsamakoy[1] examined the blood of eighteen patients at different periods of the eruption of measles and in one at the onset of desquamation. In one case of confluent and hemorrhagic eruption he found bacilli with rounded extremities, 5 to 6μ long, staining poorly with fuchsin and Löffler's blue. The same bacillus was found on culture in five or six other cases. The best medium for their growth was found to be glycerin-agar, on which they formed small, thin, transparent colonies, with serrated border and a central translucent spot. Chained forms were found in the hanging drop. Inoculation experiments were negative. The conjunctival sac was examined seven times, and in two Arsamakoy found the same bacillus that he had already found in the blood, in addition to streptococci. In three cases he found the bacillus in the nasal and pharyngeal mucus, in the discharge from the ear in one case of otorrhœa, and in the expectoration of one case. In seventeen cases of bronchopneumonia he got positive results in the lungs of five. The bacillus was obtained from the spleen in one out of fourteen cultures.

The well-known comparative immunity of young infants to this disease is well shown by a table in Steffens'[2] paper summarizing the ages of those attacked or spared among forty-one children below the age of one year. Of these forty-one children twenty-five were less than six months old, and of these but one contracted the disease; while of the seventy-six children older than the age mentioned only two escaped.

Diagnosis. BOLOGNINI'S SIGN of measles, which was first described in 1895, the sensation of friction on palpating the abdomen in a particular manner, is one that must be considered of doubtful value. His explanation of its cause is one that has not been proven, while the same sensation can be felt in other conditions. Koppen[3] has investigated the question of its value and finds that it is about equally present and absent in cases of measles. He believes that the sensation spoken of is produced by the presence of gas and liquid in the intestinal canal.

TEMPERATURE-RANGE. In connection with the pre-eruptive stage of measles the paper of Steffens should be mentioned.[4] Careful study of the temperature in this portion of the course of measles can seldom be made, and exact observations, such as those in the paper referred to, are of value.

---

[1] Bolnitch. Gazette Bakteriology, 1898, 40 and 41; abstract in Revue de Médecine, 1899.

[2] Deutsche Archiv für klinische Medecin, 1899, Band lxii. p. 323.

[3] Centralblatt für innere Medecin, July 2, 1898.

[4] Loc. cit.

In regard to the temperature during the incubation and prodromal periods, Steffens found that in thirty-six cases there was no rise of temperature until the prodromal stage, and in only four were there any symptoms of trouble. In eleven there was an occasional rise of temperature to 99.6° or 100.2° F. before the prodromal stage, and in only one of these was there any general disturbance. In ten cases studied during the period of incubation there was fever on one or more occasions. In four of these there was some accompanying cause for the rise of temperature—one was septic, two had bronchitis, while in the fourth case tuberculosis was suspected. He, therefore, concludes that in the great majority of cases the incubation stage is free from fever and the poison is absolutely latent.

In 71 cases the temperature was taken from the beginning of the prodromal stage. In 2 of these there was no rise of temperature up to the evening before the appearance of the eruption. In the other 69 cases the prodromal period was of varying length. In 4 cases it did not continue for a whole day, in 5 it lasted but twenty-four to thirty-six hours, in 17 it continued from two to two and a half days, while in only 9 cases was it of a duration of from four to four and a half days. He distinguishes two types of curve of the prodromal fever. In one of these the temperature rises on the first day, sinks to the normal on the second day, and then quickly rises until the appearance of the eruption. In the other and more frequent type the temperature steadily rises, with slight remissions.

Roger,[1] from a study of 358 cases, fixed the period of invasion as follows: None at all in 24, one day in 41, two days in 63, thirty-six days in 166, four days in 46, and five days in 18. Epistaxis was noted in 47 cases—a rather unusual number. The period of incubation was determined definitely in ten cases: in 2 it was eight days, in 1 nine days, in 1 eleven days, in 4 twelve days, and in 1 it was thirteen days.

KOPLIK'S SIGN. The difficulty of making an early diagnosis of fevers having a long period of invasion is so great that any aid in arriving at an early conclusion in regard to the nature of the disease undergoing evolution cannot help being of extreme value. For this reason the early sign of measles described by Henry Koplik two years ago is one of such value that its continued confirmation by other observers is a source of gratification. Incidentally it might be said that although it has been claimed that the same sign had been previously observed and described, yet to Koplik is due not only the credit of independent discovery, but also of urging upon the profession the importance of this sign and causing its existence to be more generally recognized. In the

---

[1] Revue de Médecine, April, 1899.

Fig. I

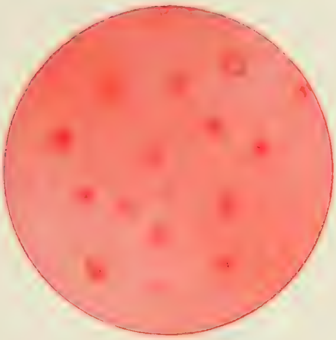


Fig. II.

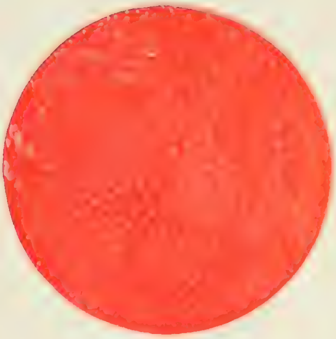


Fig. III.

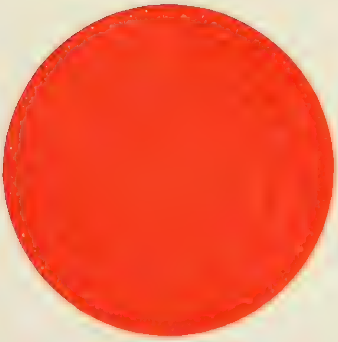
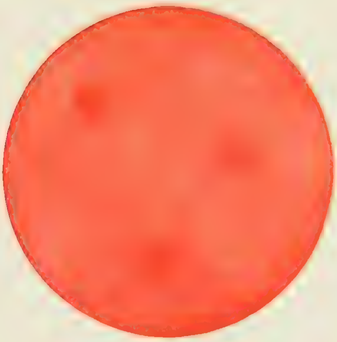


Fig. IV.



The Pathognomonic Sign of Measles (Koplik's Spots).

FIG. 1.—The discrete measles spots on the buccal or labial mucous membrane, showing the isolated rose-red spot, with the minute bluish-white centre, on the normally colored mucous membrane.

FIG. 2.—Shows the partially diffuse eruption on the mucous membrane of the cheeks and lips; patches of pale pink interspersed among rose-red patches, the latter showing numerous pale bluish-white spots.

FIG. 3.—The appearance of the buccal or labial mucous membrane when the measles spots completely coalesce and give a diffuse redness, with the myriads of bluish-white specks. The exanthema on the skin is at this time generally fully developed.

FIG. 4.—Aphthous stomatitis apt to be mistaken for measles spots. Mucous membrane normal in line. Minute *yellow points* are surrounded by a red area. Always discrete.

Medical News of June 3, 1899, there is an article again describing the sign and showing the difference between it and the eruption described by Flindt. The accompanying illustration is taken from Koplik's article. The sign appears as long as twenty-four or forty-eight hours, or even three to five days, before the appearance of the skin lesions. Of fifty-two consecutive patients examined in Koplik's clinic and subsequently studied at their homes, in thirty-two cases the diagnosis was made before any sign of eruption appeared on the body. In three of the cases the diagnosis was made three days before the appearance of the exanthem; in nine, forty-eight hours, while in twenty a day elapsed before the eruption appeared. As described by Koplik, the sign is present pre-eminently on the mucous membrane of the cheeks and lips; it is not present on that of the soft or hard palate or on the fauces. The eruption is at first discrete,then becomes confluent, and is at its height when the skin eruption appears, after which it begins to fade. Strong daylight is requisite for the study of the eruption. It is described as consisting of small, irregular spots of a bright-red color, each spot showing in its centre a minute, bluish-white speck. It is to this bluish-white speck that Koplik calls particular attention. The situation of the spot on the red background and its bluish-white color are the most marked characteristics. The bluish-white spot can be picked off with forceps, and can be removed with rubbing, although not ordinarily removed with simple manipulations with the finger. At its height the appearance of the mouth is described, as regards its buccal and labial surface, as being of a uniform rose-red color, studded with myriads of bluish-white specks. The early appearance of the spots on the mucous membrane allows of a diagnosis being made at a varying time before the true exanthem appears—an important point in view of the necessity for isolation in even the early stage of measles. Not only so, but the presence of these bluish-white spots on the buccal and labial mucous membrane would be of great assistance in distinguishing true measles eruption from other skin lesions simulating them. Koplik's sign has received sufficient confirmation to make it trustworthy evidence of the presence of measles.

Among others who have confirmed the value of Koplik's sign is Walter Lester Carr,[1] who in an epidemic of 115 cases found the sign to be of great value as an early evidence of the disease.

Complications. The occurrence of chronic bronchitis, bronchiectasis, chronic inflammatory processes in the lung, and adenopathy of the bronchial glands is so frequent, and other systems besides the respiratory are so seldom affected, that a paper before the Clinical Society of London, December 13, 1898, by Batten, is worthy of notice. In it he has reported the case of a child, aged seven years, who had gone through an attack of measles three months before it was noticed to drag the left leg, and later the right leg. Six months after this event the hands became involved. Atrophy of the muscles of both legs, with inability to extend or flex the feet, was present. The knee-jerks were preserved; there was no involvement of the bladder or rectum. No fibrillary tremor was present. The thenar, hypothenar, and interossei muscles were wasted. Faradic irritability was lost, while reaction to galvanism was diminished in the atrophied muscles.

---

[1] Archives of Pediatrics, January, 1899.

In an article in the *Archives de Médecine des Enfants*, February, 1899, Sevestre and Bonnus report that they have seen many cases of laryngitis occurring in measles. Three cases are reported requiring intubation before the appearance of the eruption. They state that the laryngeal symptoms usually disappear as the exanthem becomes evident, but that they may not do so.

Sotow[1] reports three unusual sequelæ following measles. One case developed tremor of the head a month after the onset. In a few days this spread to the arms and legs, so that the patient could not walk or stand, but could use the arms freely. Fibrillary twitchings were present in the hands and the fingers and the small muscles of the face. The tremor occurred from three to five times per second. They gradually disappeared. In the case of a four-year-old boy there were, during the prodromal stage, six attacks of loss of consciousness, with spasms. Upon recovery from his measles there were left insomnia, with mental impairment and maniacal attacks. Inasmuch as the eggs of tæniæ were found in the stools, and as the patient passed from under observation before thorough treatment could be carried out to get rid of the parasite, it is a question whether the latter might not have had some share in producing the nervous symptoms. In a third case retinitis and albuminuria followed measles in a nine-year-old child whose urine never contained either albumin or casts. Strubell[2] had a case under observation wherein periostitis orbitæ developed as a complication.

In his paper on the "Eye Complications of Acute Infectious Fevers," Percy Fleming[3] speaks of conjunctivitis, corneal ulcers, blepharitis, and also mentions the fact that optic neuritis, while rare, is an undoubted complication. Transient amblyopia, without any evidence of trouble with the fundus, is said also to occur, and while it is analogous to uræmic blindness, he states that it is quite independent of renal disease. Paralysis of accommodation has been noted, but is unusual. He states that orbital abscess causing proptosis has been observed.

---

[1] Jahrbuch fur Kinderheilkunde, Band l., Heft 1 and 2, p. 1.

[2] Münchener medicinische Wochenschrift, 1898, No. 42.

[3] British Medical Journal, April 29, 1899.

In three of Steffens' cases the attack of measles was immediately followed by another exanthem. In one varicella, in another scarlatina, in the third acute pemphigus succeeded.

F. Forster[1] reports two cases of measles with acute pemphigus; two of general emphysema, and one case of cardiac thrombosis and embolism occurring in cases of measles of usual type in other respects.

Recurrence. The occurrence of a second attack of the eruptive fevers is unusual, but in the case of most of these diseases such have been observed. Doubtless many of the supposed second attacks of measles are in reality not so, but one of the illnesses has been rötheln. There are, however, undoubted instances of true re-infection. Lately, S. L. Coleman[2] reports the occurrence of a relapse in measles in two cases during an epidemic. In his first case the relapse occurred one week after the disappearance of all signs of the primary invasion, while in the second case three weeks elapsed between the subsidence of the primary attack and the recurrence. The eruption and other manifestations of the primary attack appear to have been reproduced in the relapse.

---

[1] Jahrbuch für Kinderheilkunde, Band xlviii., Heft 1.

[2] Medical News, May 13, 1899.

DISEASES OF CHILDREN.

By ALEXANDER D. BLACKADER, M.D.

DISEASES OF THE NEW-BORN.

In the special disorders to which the new-born are liable no advance of great importance during the past year has to be chronicled. The following papers have sufficient interest, however, to warrant attention.

Lowered Temperature in Congenitally Weak Infants. In a communication read before the Academy of Medicine of Paris, M. Berdin[1] emphasized the seriousness of a lowered body temperature in infants congenitally weak. With this lowered temperature he frequently met with progressive weakening of the pulse and the respiration, not unlike the results noted in the experiments of Chossat upon small animals in a state of inanition. If rapid loss of weight accompanied these symptoms a fatal ending invariably ensued. An editorial in *Obstetrics*, June, 1899, likewise emphasizes the importance in the asphyxiated new-born infant of avoiding chilling of the surface. Such an infant, it says, if swung through the air according to the Schultze method, will lose from twelve to fifteen degrees of heat in as many minutes, the amount of loss depending somewhat upon its plumpness. So long as the fœtal heart-action continues, resuscitation is possible if only the loss of animal heat is prevented. The heart continues to act in the new-born longer than is generally supposed. Neugebauer[2] reports the continued contractions of the heart of an embryo of fourteen weeks for three hours, pulsations occurring every two or three minutes. In the same journal Opitz reports two cases of fœtuses born at full time in whom the heart beat for thirty minutes, although no respirations occurred, and cases have been reported in which the heart *post-partum* has beaten for a still longer time without respiration taking place.

It is possible that many a still-born child whose heart was still contracting has been laid aside as dead. While attempting resuscitation it is desirable that blood communication between child and placenta should remain unimpeded, and that the uterus should not be handled unless it is bleeding. Manipulations of the cord should be as few as possible, as we know that manipulation of it *in utero* may cause heart-shock and death. Respiration may be stimulated by alternate compression and expansion of the chest,[1] and at the same time alternate applications of heat and cold, spanking, traction of the tongue, stretching of the sphincter ani, etc., may be employed, special attention being directed to the preservation of the body temperature.

---

[1] Revue Mensuelle des Maladies de l'Enfance, May, 1899.

[2] Centralblatt für Gynäkologie, November 26, 1898.

The Value of Credé's Solution in the New-born's Eyes. In an excellent paper on the treatment of *ophthalmia neonatorum,* Dr. N. L Wilson[2] discussed the advisability of using Credé's solution in the eyes of all new-born infants. He stated that, although he had never seen a cornea lost from the effects of the silver, he had seen some severe cases of conjunctivitis with haziness of the cornea brought on by the use of this method, and occasionally, notwithstanding the employment of the Credé method, purulent ophthalmia had developed. He advised, therefore, and I think justly, that except in those cases in which we have reason to suspect specific infection, it is quite enough to instruct the nurse to bathe the eyelids and lashes with sterilized water or with a weak solution of boric acid, and to exercise care that the water in which the infant's body and face have been washed should not get into the eyes.

Treatment of Ophthalmia Neonatorum. Dr. Edward S. Peck, in a paper read before the New York Academy of Medicine, December 8, 1898, stated that he had found protargol and argonin superior to a solution of silver nitrate in both the prophylaxis and treatment of purulent ophthalmia. Argonin may be employed in a 3 per cent. solution. Protargol has given him better results, and, although he does not believe that it is a more effective germicide than silver nitrate, he regards it as less irritating. The strength of a protargol solution may vary from 0.5 to 1 or 2 per cent. Before using it the affected eyeball should be thoroughly irrigated with a warm saturated solution of boric acid and afterwards the protargol solution, of the strength of 0.5 to 1 per cent., should be carried rather forcibly over the eyeball into the folds by means of a pipette. This should be repeated four or six times a day until the secretion lessens in amount, when the solution should be weakened and used less frequently. Examinations for gonococci should be made every second day, and the eye should not be regarded as safe until a full week has elapsed without their discovery. These drugs must, however, as yet be regarded on trial, and I believe that the general opinion of the profession is still in favor of the use of silver nitrate in this very serious affection.

Arthritis in Infants following Purulent Ophthalmia. In a communication to the Royal Medico-Chirurgical Society at its meeting on January 24, 1899, Mr. R. Clement Lucas drew attention to this complication of ophthalmia neonatorum. In 1885 he published an account of three cases, in which he stated that he considered that the joint affection was secondary to and dependent upon the ophthalmia. Since then other cases have been reported by Continental writers, so that he has now collected twenty-three cases of this comparatively unrecognized affection. Of these eighteen were in the new-born, while five were cases of secondary infection in older children, the eldest being seven years of age. The joint affection is seen in two forms—either a very acute arthritis accompanied with much swelling, redness, and tenderness, suggesting a tendency to suppuration, or running a more subacute course, with considerable effusion and pain on movement, but with little surface redness. While the ophthalmia generally makes its appearance about the third day after birth, the arthritis only shows itself toward the close of the second or during the third week. The left knee and the left wrist appear to be the joints most likely to suffer. Mr. Lucas thinks that, owing to the way in which children are generally carried, these two are the most liable to injury. The inflammation, as a rule, runs a less severe course in infants than in adults, lasting from three to five weeks, and usually ends in complete resolution. Bacteriological examination has shown the presence of Neisser's gonococcus, but two cases are reported in which suppuration occurred, and examination revealed a double infection. This affection is to be differentiated from syphilitic joint disease by its appearance at an earlier period of life and by its more rapid course. Treatment should be directed to the ophthalmia, and rest should be secured for the joint.

---

[1] Progressive Medicine, Vol. I., March, 1899.

[2] Philadelphia Medical Journal, February 11, 1899.

Hemorrhagic Disease of the New-born. An interesting investigation into the cause of this condition, with a report of ten cases, is contributed by Dr. Eleanor Kilham and Dr. Elizabeth Mercelis to the *Archives of Pediatrics* for March, 1899. They state that in the Maternity Department of the New York Infirmary, from February 19 to May 11, 1897, ten cases of hemorrhagic disease of the new-born occurred—a little more than 18 per cent. of the cases. In no instance was it possible to obtain from the mother a history of syphilis, hæmophilia, or tuberculosis; labor was normal in every case; the ward had been entirely free from sepsis, and no apparent cause could be found for the first hemorrhage. The cases followed one another in quick succession and only ceased when proper measures were taken for isolation. A careful autopsy was made in several of the cases, together with a bacteriological examination, but no conclusive results were obtained. Among the numerous micro-organisms found were the streptococcus (either alone or associated with a micro-organism having all the characters of a diplococcus of pneumonia), the bacillus pyocyaneus (either alone or associated with the staphylococcus), the bacillus lactis aërogenes, the bacillus of Gaertner, and others. The treatment of these cases was discussed in my review of last year.

Follicular Tonsillitis. Dr. Julius Eröss[1] calls attention to the fact that this affection is occasionally met with in the new-born. He has observed twenty-two cases. The symptoms in infants are not sufficiently pronounced to prompt the physician to examine the throat, so the disease is rarely diagnosed, and then only accidentally. The affection may occur as early as the second day of infant life, but is more frequently observed from the third to the fifth day—a period when it is generally recognized that the infant is more susceptible to catarrhal inflammations. According to this observer, the local signs of the affection are not marked : the inflammation is sometimes bilateral, at other times unilateral, and is apparently only superficial, not involving the parenchyma of the tonsil. The swelling is insignificant. The exudate appears in the form of small nodules of a snow-white color, about the size of a pin-head, seldom as large as a lentil ; later on these nodules become more flattened and of a yellowish color, but they never become confluent. In from one to three days they peel off. Ulceration does not occur. In half the number of cases moderate pyrexia is present. This affection is to be distinguished from sprue and from the condition generally known as Bednar's aphthæ.

Inanition Fever. Dr. Floyd Crandall[2] reports two additional instances of that acute pyrexial condition met with in the new-born to which Holt, in 1895, gave the name of *inanition fever*. The etiology of this affection is still a debated question. Holt considered it to be due to a lack of proper nourishment during the first few days of life, but it is quite possible that some urinary condition is an exciting factor. That inanition fever has so long escaped observation, and is even now considered rare by practitioners, is probably due to the infrequency with which the temperature of newly-born infants is taken. The symptoms are quite characteristic. About the second or third day the infant becomes irritable and restless, the mouth dry, and the surface of the body flushed. The secretion of urine is scanty at the outset. The fever rises gradually for twenty-four or thirty-six hours, and reaches its maximum between the third and the fifth day of life. If water or food be given freely a copious discharge of urine takes place, and the temperature falls rapidly. The diagnosis must be made by exclusion after a careful and thorough examination of the infant.

TREATMENT. The mother's breast should be carefully examined to determine whether the milk-supply is sufficient, as statements of mother and nurse upon this point are apt to be deceptive. If the supply be defective, suitable nourishment must be supplied. Newly-born infants should be given water freely. Crandall details the particulars of two cases, in one of which the temperature rose to over 105° F.

---

[1] Wiener medicinische Presse, 1898, No. 8.

[2] Archives of Pediatrics, March, 1899.

Southworth[1] calls attention to the uric acid infarctions of Virchow as a common cause of crying in the new-born, and thinks it probable that in many instances colic in the new-born is due to the irritation thereby produced in the kidneys or in the urinary passages.

Colic and constipation in the new-born may occasionally also be due to lead-poisoning. Roussel[2] has observed an instance of this, which he attributed to a cosmetic applied to heal fissures in the mother's breast.

Pemphigus Neonatorum. Dr. P. Muntz[3] has written an interesting article on this subject. The bacterial and infectious nature of the non-syphilitic form is indicated by the endemic distribution of the disease and by numerous inoculations; transmission from children to adults has also been observed in a number of cases. Although a distinctly specific micro-organism has not yet been recognized, in the majority of cases the yellow and white pyogenic streptococci have been found, either alone or associated with other pyogenic micro-organisms. Infection probably takes place from the hands of the attendant who comes into immediate contact with the tender, easily lacerated skin of the infant. As long as the vesicles are few in number the child's general health is but slightly affected. When the vesicles are numerous and invade large portions of the body there is considerable disturbance of nutrition, and should systemic infection occur death generally ensues. All persons who have dealings with an infant suffering from pemphigus should thoroughly disinfect their hands and clothing previous to attending another infant. When there are other children in a family the infant should be strictly isolated. Care should also be taken that the foci of disease do not spread in the affected child, owing to the discharge from the vesicles coming into contact with healthy portions of the body.

TREATMENT. In the way of treatment Muntz recommends placing the child once or twice daily in a lukewarm bath to which some astringent or disinfectant drug has been added. Bowdenstab and Lange recommend potassium permanganate as an efficient disinfectant. Muntz directs that the vesicles be emptied of their contents before each bath. Afterwards the infant should be carefully dried, without friction, and all the affected portions of the body should be thoroughly covered with an antiseptic powder and wrapped in sterilized gauze.

---

[1] Archives of Pediatrics, March, 1899.

[2] Ibid., July, 1899.

[3] Der Kinder Arzt, 1899, x., 25.

Purulent Encephalitis and Cerebral Abscess in a New-born Infant. Dr. Guy Hinsdale[1] reports a case due to infection through the umbilicus. In this case the mother, a colored woman, had had a previous metritis. The infant at birth weighed twelve pounds; its head was persistently retracted, and nystagmus was present. When seen on the third day by a physician the temperature was 103° F.; the mouth had the appearance of being covered with thrush; the umbilical cord had a fetid odor, and convulsions were present. It refused to nurse, and died on the thirteenth day. At the autopsy, nine hours after death, pus was found below the pia, covering all the surfaces of the brain; in the left frontal lobe was a recent abscess; similarly placed on the opposite side was a large hemorrhage. Bacteriological investigation showed that the infection was due to an organism belonging to the colon group.

Cystic Degeneration of the Kidneys in the New-born. An interesting case was reported by Dr. E. E. Graham at the meeting of the American Pediatric Society. He was called to see the infant twenty minutes after birth. Although apparently well developed, it was distinctly cyanotic, breathing feebly, and could not be aroused. Death occurred forty-five minutes after birth. The heart, liver, and spleen were normal, but the kidneys were cystic.

Congenital Occlusion of the Stomach. Hammer[2] records a case of this very rare condition, of which only three cases had previously been reported in literature. The infant at first vomited large quantities of amniotic fluid, and afterwards mucus which first had a reddish but finally a dark-green tint, resembling meconium. Nothing was retained on the stomach, notwithstanding that meconium was voided daily. Death occurred on the eighth day. At the autopsy the intestines were found completely contracted and collapsed; the duodenum ended in a blind extremity in the immediate neighborhood of the stomach, while the large, dilated stomach presented the shape of an hour-glass, the whole pyloric portion being separated from the fundus by a shallow furrow. The liver, spleen, kidneys, and genitalia were normal.

ARTIFICIAL FEEDING OF INFANTS.

Variation of Proteids in Milk. In a discussion which took place at the meeting of the Philadelphia Pediatric Society, February 14, 1898, Dr. Edsall called attention to the fact that in ordinary milk the proteids are a very uncertain quantity. In doing metabolism work he had for a period of two months made daily estimations of the proteids present in milk supplied by one dairy. In that time the proteids sometimes varied within twenty-four hours from 4.1 per cent. to 2.7 per cent. This variation occurred in winter when the cattle were fed with regular amounts of fodder, but in the spring, when they were fed irregularly upon fresh grass, the daily variations became still greater. The variations in the amount of fat were also very considerable, although in milk modification these are of less importance as cream of a known percentage is generally employed.

---

[1] American Journal of the Medical Sciences, September, 1899.

[2] Prager medicinische Wochenschrift, 1899, xxiv., 25.

Separation of Bacteria in Milk. In a very interesting paper read before the American Pediatric Society, Dr. R. G. Freeman[1] stated that the great bulk of the bacteria which contaminate milk may be separated, without the use of filtration, heat, or the addition of any preservative, by the natural process of permitting the cream to rise. For obvious reasons the bacterial examination of milk has always been made in specimens obtained after thorough mixing of both milk and cream. Owing to this technical procedure an interesting and important natural phenomenon has been overlooked. If milk be allowed to stand until cream rises, and a separate analysis is made of the milk and cream, it will be found, taking the average of a considerable number of analyses, that the cream contains some three hundred times as many bacteria as the milk, and that with the rising of the cream about 99 per cent. of the bacteria have been removed from the milk. This separation of the bacteria with the cream is probably due to the carrying up of bacteria by the fat-globules as they rise. The extent to which bacteria may be removed from the milk by this process, which may be called an inverse precipitation, is shown by the following experiments: One sample of milk that contained 4000 bacteria per cubic centimetre, after the separation of the cream showed only 36 per cubic centimetre. Another sample which showed nearly 8000, showed after the cream was separated only 20 per cubic centimetre.

The practical bearing of this is obviously very important. Cream, without previous sterilization, should never be used in the preparation of infants' food; and in those cases in which sterilization of the milk appears to interfere with its digestion and assimilation by the infant, almost all the bacteria present may be separated by allowing the cream to rise. The cream may then be Pasteurized or sterilized and again mixed with the comparatively germ-free raw milk.

Cereals in the Preparation of Infant Foods. This question has received fresh interest from the investigations of Keller,[2] who, in a paper on *the influence of the carbohydrates on the destruction of proteids in the infantile organism*, states that the addition of maltose to diluted cows' milk decreases nitrogenous elimination in the infant. He first determined the amount of nitrogen in the urine of infants when fed upon diluted cows' milk alone, and then when maltose was added to this milk. He found that when the dietary of the infant was cows' milk only the elimination of nitrogen by the kidneys varied from 1000 to about 1150 milligrammes. When 60 grammes of maltose were added to the daily dietary of milk the amount of nitrogen eliminated began to diminish, and within four days had dropped to 500 milligrammes. When the maltose was increased to 100 grammes there was a further diminution of the nitrogen in the urine to 380 milligrammes. When the maltose was omitted the excretion of nitrogen increased at once, in a few days reaching again 1000 milligrammes. The elimination of phosphoric acid was found to be influenced by the addition of maltose in the same way as the nitrogen.

---

[1] Archives of Pediatrics, August, 1899.

[2] Centralblatt für innere Medecin, January 14, 1899.

Experiments were also made as to the relative amount of nitrogen absorbed and eliminated under varying dietaries. The results showed that when milk alone was given absorption was over 93 per cent., but elimination was excessive and only 5.8 per cent. of the nitrogen was retained in the system; when, however, 75 grammes of maltose were added to the daily amount of milk the absorption was slightly less—only 88 per cent.—but 23.5 per cent. of the nitrogen was retained. The infant on whom these experiments were made was five months old and apparently in good health.

Experiments were then conducted on several sick children, in the hope of ascertaining whether it is possible in such to prevent undue loss in the nitrogenous elements by the addition of carbohydrates to the dietary. To an infant nine months old, suffering from a persistent gastro-enteritis, 750 cubic centimetres of cows' milk diluted with two-thirds its amount of water were given daily; afterward 500 cubic centimetres of cows' milk, similarly diluted, were given, but with the addition of 40 grammes of maltose. During the first period the infant lost distinctly more than it did in the second. A further series of experiments was made on another child, also suffering from gastro-enteritis, and it was found that while taking pure milk it retained only 0.7 per cent. of the nitrogen ingested, but when maltose was added to the milk the amount retained was 12.7 per cent.

Keller gives tables of the results obtained by other investigators, showing that in infants nourished at the breast nitrogen retention is very high—in one instance it reached the astonishing amount of 85.5 per cent.— while in infants to whom cows' milk was given without the addition of any carbohydrate a very low retention percentage of nitrogen was obtained; on the other hand, those to whom various carbohydrates were given in addition to the milk showed retention of a distinctly greater percentage. The actual absorption of nitrogen in almost every instance was less, as in Keller's experiments, when carbohydrates were employed than when milk was given alone; but the percentage of absorbed nitrogen retained in the system was much greater when the carbohydrates were added to the dietary.

It is evident, therefore, that the addition of carbohydrates to an infant's food has, in some circumstances, a marked influence on nitrogenous metabolism. Cows' milk, however, diluted with twice its amount of water, as used in Keller's experiments, is as a food very defective in both fat and sugar. Maltose to some extent supplies this deficiency and lessens the nitrogenous loss, yet it appears to do this much less perfectly than the hydrocarbons in mothers' milk.

These results obtained by Keller should be considered in connection with the investigations of Heubner[1] on the gain in weight and strength in infants under different methods of feeding. By placing infants in glass-walled chambers connected with a respiration apparatus he was able to study their metabolism in a way not previously attempted. The amount of food taken by each was carefully ascertained, and all their excreta (gaseous, fluid, and solid) were collected and carefully estimated. Heubner, as a result of his experiments, emphasizes the importance of non-nitrogenous foods which favor growth by protecting the albumins from useless decomposition. The growing infant requires that the albumin be retained in the system, but so soon as the non-nitrogenous foodstuffs sink below a certain level the albumin is no longer retained. It has not yet been determined which of the non-nitrogenous foodstuffs plays the more important rôle. In the healthy infant fats are probably as useful as sugars, but in cases of intestinal disturbance the carbohydrates appear the more important. The experiments showed, further, that albumin in the form of casein is digested and readily assimilated. Only when it fails to be digested from overfeeding or from disorder of the stomach does it prove harmful by decomposition. The amount of albumin necessary for an infant is not dependent only on its age or body-weight, but also on its condition. Excess of albumin is of no service; on the contrary, it may do harm, as it leaves the body in the form of decomposition products and throws unnecessary work upon the infant organism. Heubner also considers that an excess in the quantity of water taxes the energy of the organism unnecessarily.

Chapin,[2] in a paper read before the American Pediatric Society at its annual meeting, again asserted that the use of a thin, farinaceous gruel as a diluent tends to lessen the firmness of the coagulum formed by cows' milk, and thus renders it more easily digested. He carried out a series of careful experiments, and stated that the clot formed in a mixture of milk and barley-water was, despite statements to the contrary, distinctly more flocculent and more easily digested in an artificial gastric juice than the clot formed in milk or in a simple mixture of milk and water. In the discussion which ensued many of the members expressed their belief that in some infants the use of a thin, farinaceous gruel as a diluent was of distinct value. Rachford stated that as the result of several experiments he learned that pancreatic juice acted more readily on a mixture of albumin and starch than it did on either of these foodstuffs alone. The presence of acid albumin expedites the conversion of the starch, and, on the other hand, the presence of starch favors the proteolytic action of the pancreatic juice.

---

[1] Berliner klinische Wochenschrift, January 2, 1899.

[2] New York Medical Record, August 5, 1899.

Summing up the important points in these very interesting papers, it is evident that milk simply diluted with water makes a faulty dietary for the infant, and one upon which its nutrition will fail. The infantile organism demands that the non-nitrogenous elements of its dietary be supplied in sufficient amount. In milk modified according to Rotch's views these are supplied by fat and sugar of milk, and, in general, this is the best plan, but instances will occur where the addition of maltose to the dietary appears to be of distinct benefit.

Modification of Milk. Townsend,[1] writing on the home modification of milk, says that in digestive disturbances, where the fat, sugar, and albuminoids have all to be reduced to a minimum, the nutritive value of the mixture may be increased, without taxing the digestion, by the addition of the raw white of egg. A. C. Cotton[2] also advises that egg albumen be substituted for the indigestible proteid of cows' milk in cases in which no attainable modification of cows' milk will meet the requirements.

MILK WHEY. Ashby emphasizes the value of milk whey in infant-feeding, and thinks that it is often of much service in supplying nutrition to sick infants or to those who have weak digestions. According to König, the composition of whey as ordinarily prepared is as follows: Proteid, 0.85; fat, 0.23; lactose, 4.71; salts, 0.65; water, 93.24. When whey is required as a food it is desirable that some of the fat should be retained. This may be effected by thorough agitation of the curd before straining. Whey prepared in this way contains proteid, 0.97 per cent.; fat, 2 per cent.; salts, 6.1 per cent. With or without an addition of two or three drachms of milk-sugar it makes a useful food for newly-born infants who have to be artificially fed, or for infants who suffer from chronic vomiting or have liquid green and curdy stools. On it they will gain weight and be more comfortable than on other forms of diluted milk.

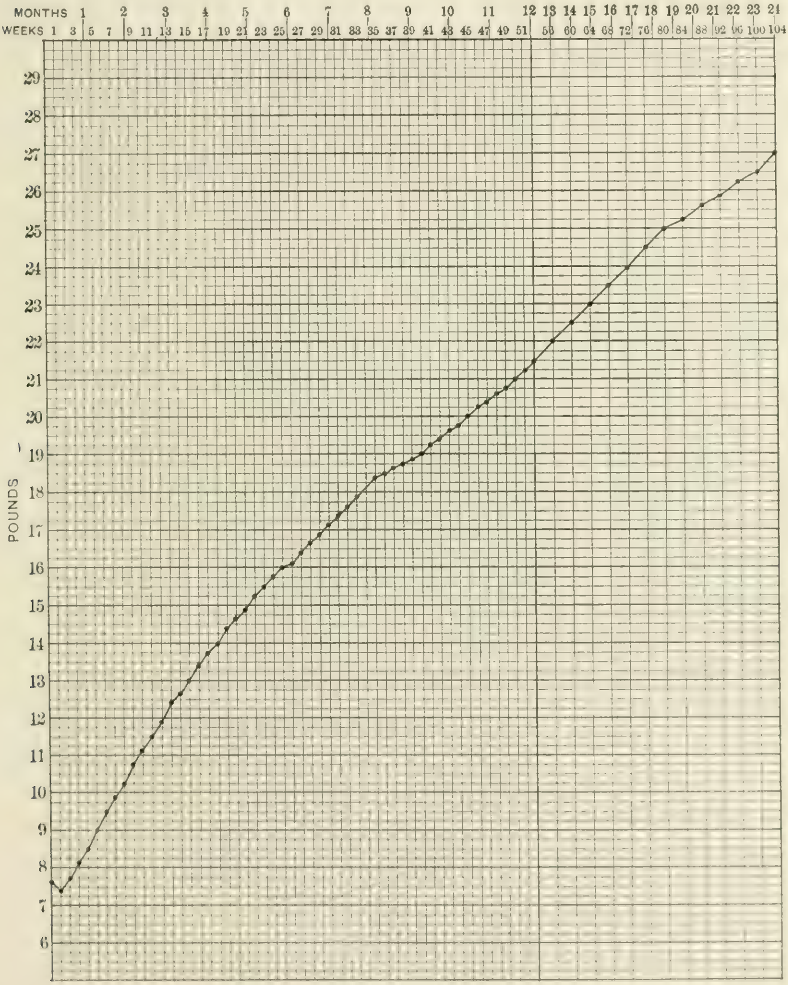
---

[1] Boston Medical and Surgical Journal, 1899, vol. cxl., No. 12.

[2] Journal of American Medical Association.

A few grains of bicarbonate of soda may be added to render the mixture neutral or slightly alkaline. In some cases this whey may be diluted with a solution of maltose or barley-water; some dyspeptic infants, however, cannot digest as much as 2 per cent. of fat, and for them this element must be lessened. Dr. Ashby has frequently seen infants improve and gain in weight after whey has been substituted for sugar or barley-water. His experience is strongly in its favor.

FIG. 17.



Dr. Crozer Griffith's weight chart.

Weight of Infants. In all cases where the physician has to take charge of the feeding of an infant it is desirable that an exact record should be kept of its weight. Dr. Crozer Griffith has designed a weight chart which represents the average rate of growth of healthy breast-fed children for the first two years of life. Under ordinary conditions the weight should be recorded once each week; but where a change in the method of feeding is being made half-weekly records are advisable.

Koplik[1] has carried on an investigation to ascertain the average gain of infants attending the out-door clinic of a hospital where the more recent methods of preparation, modification, and sterilization of milk are employed, and compares his results with those obtained by Kammerer in Germany. In Koplik's series of cases infants between twelve and sixteen weeks old were found to make an average daily gain of 23.6 grammes, and between twenty-eight and thirty-two weeks an average daily gain of 15.6 grammes. This compares very closely with the results obtained by Kammerer, who for the first period obtained an increase of 22 grammes daily, and for the second 16 grammes daily.

AFFECTIONS OF THE ALIMENTARY TRACT.

Stricture of the Œsophagus in Children. At a meeting of the Philadelphia Pediatric Society, held April 11, 1899, Dr. J. H. Jopson[2] read a paper on "Stricture of the Œsophagus in Children." The swallowing of lye or caustic substances is the most frequent cause of this serious condition. Strictures thus produced are of the most intractable nature; their tendency is to a progressive contraction until even soft liquids encounter obstruction and symptoms of starvation are added to those of stricture.

TREATMENT. An attempt should be made, by the passage of soft bougies, to ascertain the location, calibre, and permeability of the stenosis. In cases not responding quickly to gradual dilatation from the mouth, gastrostomy is demanded, after which retrograde dilatation may be attempted. The mistake is usually made of putting off the operation too long. Franz Ehrlich[3] reports a case of stricture of the œsophagus in a boy of five years, following ulceration of the throat—the result, apparently, of an attack of scarlet fever with diphtheria. There was no history of syphilis nor of the swallowing of any caustic substance. Symptoms of stricture manifested themselves shortly after convalescence, and progressed until all attempts at swallowing were followed by immediate vomiting. The child became much emaciated. The passage of a sound revealed a stricture between eighteen and twenty centimetres from the incisor teeth. Gastrostomy was performed and dilatation attempted, first by means of silver balls after König's method, but, as this was unsuccessful, water pressure was afterward employed and by it the stricture was slightly dilated. Subsequently the introduction of sounds brought the diameter up to 12 millimetres. The gastric fistula was then closed, and the general condition of the boy when the case was reported was good. A similar case was previously reported by Eiselberg. The two cases appear to be unique in their etiology.

---

[1] New York Medical Record, October 28, 1899.

[2] Philadelphia Medical Journal, April 15, 1899.

[3] Berliner klinische Wochenschrift, October 17, 1898.

It is to be remembered that hysterical spasm of the œsophagus may occasionally be met with. Cattaneo[1] reports the case of a child, aged twelve years, who suffered from symptoms of œsophageal stricture which set in suddenly after swallowing a glass marble. Vomiting frequently followed the attempt to swallow. A sound was passed quite easily and revealed no constriction. There were other symptoms of hysteria. As the treatment, carried on for a long period, had availed little, the writer told the patient that he had found the stricture, which would be cured in eight days if a sound was passed regularly each day. This prediction was verified.

The Digestive Power and Motility of Infants' Stomachs. Two interesting papers have appeared during the past year on the digestive power and motility of the stomach in healthy and in sick infants. Bauer and Deutsch[2] undertook a series of investigations on a large number of infants to determine the character of gastric digestion in infants under varying circumstances. In these investigations the stomach was first carefully washed out, food was then administered and after a definite period withdrawn, and the contents thus obtained were carefully examined. The rapidity of absorption was tested by the administration of potassium iodide, and motility by the administration of salol. As the result of their investigations Bauer and Deutsch found that in healthy nurslings and infants there is generally an excess of lactic acid at the beginning of digestion and of hydrochloric acid toward the end. The motor activity and the power of absorption are at this age almost the same as in adults. In nurslings suffering from gastro-intestinal affections free hydrochloric acid is not present, and the amount of the combined acid is less than normal; lactic acid, and sometimes butyric, exists in notable quantity, and occasionally acetic acid is present in small quantity. Where the disease is limited to the intestines, however, free hydrochloric acid is sometimes present, but both the motor activity and the power of absorption appear to be distinctly altered. In cases associated with fever, free hydrochloric acid is not present and the amount of combined acid is diminished; activity is distinctly lessened, but as the fever falls free hydrochloric acid reappears.

---

[1] Gazetta degli Ospedali, September 4, 1898, quoted in Medical Review of Reviews, March, 1898.

[2] Jahrbuch für Kinderheilkunde, 1898, vol. xlviii.

Wolff and Friedjung[1] regard motor insufficiency, accompanied by lactic acid fermentation in the stomach contents at a period when digestion should be completed, and the occasional presence of volatile fatty acids, as the only positive indications of defective digestive power.

Congenital Stenosis of the Pylorus, with Hypertrophy. Romme[2] reviews the subject of congenital stenosis with hypertrophy of the pylorus in the new-born—an affection to which I made reference in my review of last year. The more important symptoms by which this condition is recognized are, he says: 1. Vomiting following soon after the digestion of even small quantities of food. 2. Visible peristaltic movements of the stomach, with indications of dilatation of that organ. 3. The presence of a distinct tumor in the region of the pylorus.

A number of such cases during the past two years have been recognized and clinically reported; most of them have had a fatal termination. Romme quotes a recent paper by Pfaundler,[3] who, basing his views on anatomical rather than on clinical evidence, questions the existence of a condition of organic stenosis. The stomach of the nursling, he says, may present itself at the post-mortem examination under one of three forms. In the first the stomach is relatively large; its walls throughout are thin and relaxed, so that when placed on a flat surface the large and small curvatures form arcs of regular circles. This he calls the diastolic stomach. In the second group the organ is in a state of systole, its walls are thickened and firm, so that when placed on a flat surface it has the appearance of a narrow, elongated tube. Between these two types of stomach there is an intermediary one in which a part only of the stomach seems thickened, firm, and hypertrophied. This thickening is sometimes seen exclusively in the region of the pylorus, in which case its walls resemble a tumor and its orifice is found narrowed and only permeable to a sound of small calibre. Pfaundler has shown that if water be injected under feeble pressure into the systolic stomach it takes on almost immediately the aspect and form of the diastolic stomach. Its walls become soft and flexible, the tumor formed at the pylorus disappears, and the orifice, which seemed contracted, assumes normal dimensions. According to this writer, this contracted or systolic condition of the stomach is due to the state of repletion of the organ, and is in nowise due to the special affection from which the infant succumbs or to post-mortem rigidity. If death follows a long time after the last meal the form of the stomach will be diastolic; on the other hand, if death follow shortly after food has been taken the form will be systolic. Pfaundler believes that the stomach of congenital stenosis is merely a hemisystolic stomach. He admits, however, the existence of the clinical symptoms, and attributes them to a functional spasm of the pylorus. This theory, which is virtually Thomson's,[1] explains the symptoms and makes it possible to understand why they do not immediately appear at birth and why they sometimes disappear under the influence of appropriate treatment.

---

[1] Archives für Kinderheilkunde, 1898, xxv., 3 and 4.

[2] Revue Mensuelle des Maladies de l'Enfance, March, 1899.

[3] Wiener klinische Wochenschrift, 1898, xi. p. 40.

Still,[2] at a meeting of the Royal Pathological Society, February 11, 1899, also reported three cases of this affection, in which the clinical symptoms during life were distinctly marked; necropsy in each case revealed dilatation of the stomach and hypertrophy of the pylorus, but in all three cases the lumen of the pylorus was normally patent. The hypertrophy was almost entirely muscular, without inflammatory phenomena or proliferation of connective tissue. Still also expressed the opinion that this hypertrophy was due to spasm produced by some fault in nervous co-ordination.

TREATMENT. Should the above view prove the correct one, gastroenterostomy for the relief of the condition is only to be considered as a final measure. The chief reliance in treatment is to be placed on prolonged baths at a temperature of 98° to 100° F., followed by warm compresses over the abdomen, and on systematic lavage of the stomach, thus diminishing its muscular tone and relaxing the pylorus. Belladonna may also be of service, associated with those drugs which will act as local gastric sedatives.

Rumination in Children. A modified form of *rumination* is occasionally met with in children. Peter[3] relates the case of a lad, nine years old, with a neurotic family history, who, during the previous two years, had been noticed by his parents and school-fellows to bring up for some time after his meals portions of food, and to chew and reswallow them. On being questioned he said that the food came up without effort. The food thus regurgitated at first was sweet, and the patient could recognize by taste the various articles of diet; but afterward it became sour, and he felt like rejecting it. Careful and repeated examinations with a bougie failed to demonstrate the existence of any pouch or obstruction. The writer regards the condition as a neurosis associated generally with neurasthenic conditions, sometimes with idiocy; more rarely it appears to be hereditary. It is more frequently met with in males than in females; the prognosis is good.

TREATMENT. Treatment should be directed to the neurasthenic condition, and an effort should be made to strengthen and stimulate the patient's will to prevent a continuance of the habit.

---

[1] PROGRESSIVE MEDICINE, Vol. I., March, 1899, p. 115.

[2] Medical and Surgical Review of Reviews, March, 1899.

[3] Pediatrics, July 15, 1899.

Gastrodiaphany of the Infant's Stomach. Koplik[1] speaks highly of this procedure as a means of diagnosis in difficult cases, and has devised an instrument suitable for the purpose. The thinness of the abdominal walls admits of a much more distinct picture than is possible in the adult's stomach. In all the cases he has thus far examined the pylorus has been found in the middle line, in a few cases behind the liver, but as a rule just beneath the border of the liver. The stomach lies horizontally with the greater curvature beneath the ribs, on the left side. Both can be readily mapped out. He thinks that such an instrument may prove of value as a means of determining the exact size of the stomach and possibly the condition of the pylorus. It will be found most useful in infants under six months of age, but can be used up to the twelfth month. It should, of course, be used only in extreme cases.

Gastro-enteritis. No new facts have to be added to what I wrote last year in reference to the etiology or treatment of the acute gastro-enteric disorders of infancy.

P. d'Orlandi[2] has investigated the INFLUENCE OF GASTRO-INTESTINAL DISEASE ON THE BLOOD IN NURSLINGS. He states that after numerous and careful examinations he found that the chief effect appears to be diminution in the number of the red cells. Leucocytosis is very rare in all forms of intestinal disorder. In chronic affections, on the contrary, with cachexia, there is frequently a slight hypoleucocytosis. There is also, he says, a constant diminution of the large mononuclear leucocytes and of the red eosinophiles. At the present time one is unable to draw any conclusions from these facts.

RENAL COMPLICATIONS OF GASTRO-ENTERITIS. Two interesting papers have appeared during the year on the renal complications of the acute intestinal affections of infancy. During the summer of 1898, Morse[3] examined the urine of seventy infants ill with uncomplicated diarrhœal diseases. They were all out-patients at the Infants' Hospital, hence the urine was seldom examined more than once in the same case. The children were all under two years of age, and two-thirds of them under one year. The clinical diagnosis was fermental diarrhœa in sixty-four cases and ileocolitis in six. The urine was always obtained by catheterization. Scrupulous care was taken as to the cleanliness of the catheters, and, so far as was known, no injury whatever resulted from their use. Albuminuria was found present in about 15 per cent. of all the cases, and hyaline or finely granular casts in about 60 per cent. of those cases in which albuminuria was present. The presence, however, of albumin and casts does not justify the term "nephritis," but is indicative merely of degenerative changes due to the action of either the bacteria or the toxins. The condition is not dependent upon any special symptoms or combination of symptoms, and, in Dr. Morse's opinion, is not of bad prognostic import. True nephritis he considers to be a very unusual complication of the acute diarrhœal diseases of infancy. This may be regarded as the opinion of a large number of pediatrists.

---

[1] New York Medical Journal, May 6, 1899.

[2] Revue Mensuelle des Maladies de l'Enfance, July, 1899.

[3] Archives of Pediatrics, September, 1899.

Koplik[1] describes twenty-five cases of gastro-enteritis in which the urine showed changes indicative of renal trouble. In a few of the severer cases he attributes some of the symptoms that arose to a uræmic condition. The prognosis is not necessarily bad.

Treatment consists in the free administration of water, in irrigation of the stomach and the intestinal tract, and in the administration, if necessary, of saline solution by subcutaneous injection. The diet should be restricted to albumin and barley-water, and all drugs that may interfere with elimination are to be stopped.

Infantile Atrophy. Baginsky[2] divides infants suffering from marasmus into two groups: The first comprises those in whom the marasmus is due to prolonged starvation (primary atrophy of Fedé), and in whom after death the intestinal wall is found almost perfectly normal, and here death takes place not from failure to absorb the nutriment supplied but from an actual lack of nutriment. The second group includes those who, as a result of previous disease, are unable to assimilate the nourishment given them. Investigations into the metabolism of such children showed that about 50 per cent. of the nitrogen in the diet was excreted unabsorbed in the feces, while the amount of nitrogen excreted by the urine considerably exceeded the quantity absorbed. The emaciation of these infants is thus readily explained. An examination of the pathological conditions present revealed lesions in the intestinal mucous membrane, with more or less atrophy, seriously interfering with the absorption of the nutritive material ingested. Baginsky concludes, therefore, that infantile marasmus is the result of defective absorption and assimilation, due frequently to atrophic changes in the intestinal tract, complicated with a certain degree of auto-intoxication; but he does not attribute any specificity in the production of this condition to the micro-organisms which thus far have been found in the intestinal canal.

TREATMENT. Baginsky calls attention to the impossibility of producing any improvement in these cases until radical changes are made in the method of nursing and in the environment. Each child should receive individual attention and nursing, and it is owing to the impossibility of securing this special care in asylums and in the homes of the poor that the fatality of this affection is so great.

---

[1] New York Medical Record, April 1, 1899.

[2] Deutsche medicinische Wochenschrift, May 4, 1899, and British Medical Journal, May 6, 1899.

Nervous Incontinence of Feces. Dr. Crozer Griffith,[1] in a paper read before the Philadelphia Pediatric Society, March 14, 1899, called attention to this comparatively infrequent condition, closely allied to incontinence of urine, and, in the case he detailed, associated with it. The patient was a boy, aged eight years, slightly built but otherwise well developed, who had always suffered from incontinence of urine, nocturnal and diurnal. For two years he had had choreiform twitching of the face and shoulders. The incontinence of feces had persisted since birth. Two or three stools occurred daily, and were generally passed in the clothing before a place for relief could be reached; they were not passed unconsciously, and no cramp or other painful sensation attended the evacuation. The lad said that a sudden desire seized him, which he could not control. Punishment only made the matter worse. Examination revealed a long prepuce, without adhesions, and a normal rectum. His twitching appeared to be of the nature of a habit-spasm rather than a true chorea. He was placed on Fowler's solution, with increasing doses of tincture of belladonna. At the end of six weeks the fecal incontinence seemed to be entirely cured. The treatment was continued for three months, and then stopped, but shortly afterwards the incontinence returned to some extent; the treatment was, therefore, recommenced. In a case very similar to the above, Dr. Gordon Campbell employed with excellent effect tincture of iron perchloride associated with increasing doses of belladonna. The slight constipation induced by the iron apparently assisted the retention.

Congenital Idiopathic Dilatation of the Colon. Dr. Crozer Griffith,[2] in a paper read before the Association of American Physicians, May, 1899, has given us an excellent *résumé* of our knowledge of this obscure condition. For the present the term idiopathic is applied to the condition, but it is to be regarded as expressing our ignorance rather than an actual fact. We only know that it is not due to constipation, nor to a shortened mesocolon, nor to a stenosis of the canal. By the term congenital we do not necessarily imply that an actual dilatation was present at birth, but merely that the tendency to dilatation manifested itself shortly afterwards. In twenty-four undoubted instances of this affection constipation and abdominal distention were prominent symptoms from the first few weeks of infancy. In the larger number of cases constipation was noted first, but in a few instances abdominal distention appears to have antedated it. The distention was always tympanitic; frequently the outline of the distended colon could be perceived through the thin abdominal walls, and peristaltic movements were visible. Pain and tenderness in the abdomen were slight or absent altogether as a rule; vomiting was only occasional; hard, scybalous stools have been the exception. The symptoms point rather to an inability of the colon to propel its soft contents than to its blocking by hard masses. Not infrequently diarrhœa is present. The general health has always suffered sooner or later; the prognosis is most unfavorable. Of the twenty-four cases reported, twenty were males and only four females. The pathological condition present is one of enormous dilatation, affecting more or less the whole of the colon, and sometimes involving the rectum.

---

[1] Archives of Pediatrics, June, 1899.

[2] American Journal of the Medical Sciences, September, 1899.

TREATMENT The indications for treatment are to maintain, and if possible to improve, the general health; to secure regular evacuation of the bowels—employing for this purpose, if necessary, purgatives or enemata. In cases not associated with diarrhœa or abdominal tenderness carefully performed massage may be of benefit. The use of the rectal tube to remove gas is sometimes of much service. In severe cases becoming progressively worse early operation of some sort is to be advised; in spite of the gravity of such a procedure, to leave the condition unremedied appears still more grave. The plan first proposed by Dr. Martin, of Montreal, of removing the useless dilated colon and joining the small intestine to the anus, is the only one from which effectual relief is to be expected. Such an operation was performed successfully by Treves.[1] As the operation is a serious one, the attempt to relieve by the formation of an artificial anus may well be tried first.

Intussusception. TREATMENT. Clubbe, in a very interesting paper on "Intussusception in Children," opposes the view that rectal injections are useless in this affection, and says that he is quite certain that in not a few cases the reduction can be accomplished by this means. He himself has used injections successfully in six cases. Northrup, also, at a meeting of the Pediatric Section of the New York Academy of Medicine, April 13, 1899, when reporting a case in an infant of nine months which was reduced in this way, said that he thought that in recent cases this measure should always be given a careful trial. Clubbe says that whether we see the case early or late we should inject. In early cases the intussusception is occasionally completely reduced, but in every case the mass is reduced to a certain extent in the most gentle and best possible manner, thus lessening the manipulation of the intestines necessary if the abdomen has afterwards to be opened. After the injection the tumor will be found not only distinctly reduced in size, but better localized so that a smaller opening in the abdominal wall will suffice, and less difficulty will be experienced in reaching the intussusceptum. The injections should always be given when the child is under an anæsthetic. (In this connection it is to be remembered that under the relaxation of an anæsthetic a saline injection can be made to pass through the ileocæcal valve.) Before the anæsthetic is given the child should be made ready for the operation so that if the injection does not succeed in completely reducing the tumor abdominal section may at once be undertaken. If, on the other hand, the tumor seems to have entirely disappeared the child may be put to bed, but it must be carefully watched and examined again by the surgeon in a few hours. If there is any return of the tumor operation should take place without delay. Collier[1] reports three cases in which rectal injections of oil were used until the intussusception could be clearly felt; then an incision was made directly over the tumor, and its reduction was easily effected through a small opening. Recovery followed in all three cases.

---

[1] PROGRESSIVE MEDICINE, Vol. I., March, 1899.

Graham[2] reports a particularly interesting case of ILEOCOLITIS CLOSELY SIMULATING INTUSSUSCEPTION. The history of the case was as follows: A delicate child, six years of age, habitually constipated and liable to attacks of indigestion, was suddenly taken ill with nausea, vomiting, and diarrhœa. The movements were frequent and consisted of blood and mucus, and were preceded and accompanied by pain and tenesmus. No abdominal tumor could be felt; the abdomen was relaxed. The temperature was 102° F., but otherwise the general condition of the child was good. A rectal examination was made on the fourth day, when the finger was passed three inches into the rectum and entered a cul-de-sac, about half an inch deep, which was easily followed around the entire circumference of the bowel; the central portion was occupied by a soft, prolapsed mass. Attempts to pass the finger into the prolapsed portion gave great pain. At this time there was no abdominal distention, no tumor, and no evidence of collapse. After the sixth day the stools became fewer in number, the child passed gas frequently per anum, and the conditions improved. Distinct fecal matter was passed about the twelfth day. The facts upon which a diagnosis of intussusception was negatived were as follows: The absence of any abdominal tumor, of any distention of the abdomen, of severe recurring paroxysmal pain, and of symptoms indicating severe prostration, together with the fact that flatus was passed per anum. When we consider that in a considerable number of cases of intussusception the tumor is either felt in the rectum or protrudes from the anus, the recognition of the condition recorded in this paper becomes important, and the question suggests itself whether it is not possible that some of the cases reported as intussusception are really but cases of prolapse of the rectal mucous membrane. In discussing this case Dr. Hare called attention to the fact that purgatives can only do harm where the bowel is blocked, and said that he was inclined to look with more favor upon surgical treatment than upon medical interference. Referring to the treatment of intussusception by rectal injection, he described a useful attachment that could be made to the apparatus recommended by Dr. Packard. It is a simple U-shaped tube filled with mercury. If at any time the pressure exercised by the bowel is more than the hydrostatic pressure it registers its pressure upon the mercury in the U-shaped tube.

---

[1] Lancet, August 26, 1899.

[2] Archives of Pediatrics, February, 1899.

Appendicitis in Children. Dr. Hunter McGuire[1] read an excellent paper on this subject before the Medical Society of Virginia, September, 1898. Appendicitis before the age of four years, he says, is very rare, but a case in an infant of only seven weeks has been reported. After the fourth year it is not uncommon. Of 104 cases reported in children, 3 were under three years, 47 between the fourth and ninth years, and 54 between the tenth and fourteenth years. It appears to be more than twice as frequent in boys as it is in girls. At the onset of an attack the symptoms may closely resemble those of acute indigestion, but in children symptoms are apt to be misleading and the physician who watches and waits for typical symptoms will often make his diagnosis too late. Pain is very variable as to its location and intensity. The position of the appendix is not constant; it may lie to one or the other side of the cæcum or behind it, or it may dip down over the brim of the pelvis and may only be felt by a rectal examination. The pain may be violent, or it may be so slight as not to deter the child from playing. The author reports a case in which a boy had skated at eleven o'clock the night before and was operated on the next morning, when a perforated appendix was found, with extensive adhesions and an abscess containing over three ounces of pus. Muscular rigidity is usually present, but is not equally noticeable in all cases. Nausea or vomiting is more persistent in children than in adults. The pulse is a far better indication of the gravity of the disease than the temperature, though both may be almost normal in a gangrenous appendicitis when the toxins are not escaping into the system. The face in children is often an excellent indication of the gravity of the attack, and it should always be carefully scanned in considering our diagnosis.

Acute Peritonitis rarely occurs in children from any other cause than appendicitis. During the year, however, a few interesting cases have been reported in which peritonitis had other origin. Hagenbach-Burckhardt[2] reports two cases of primary peritonitis in children due to the pneumococcus. He refers to the work of Boulay and Bruns, who produced peritonitis in guinea-pigs by injecting a pneumococcus culture into the peritoneal cavity. He also quotes Comby, who states that a pneumococcic peritonitis may be a primary infection or secondary to pneumonia. The onset is sudden, with vomiting, abdominal pain, and fever. The disease runs a course similar to that of pneumonia, and the symptoms subside in from seven to nine days. At first, recovery seems to be complete, but the abdomen remains swollen and eventually a purulent exudate is discovered. Bruns states that the disease is much more frequent in female than in male children; he refers to the possibility of the infection occurring through the generative tract—a view which is supported by the frequency with which the infection is localized in the pelvis. The two cases reported by Burckhardt were also girls. The onset was sudden, with fever and abdominal pain, tenderness, and distention. There was no previous lung involvement. A culture taken at the time of operation showed that the disease was due to the pneumococcus. In one of the cases metastatic abscesses developed in various parts of the body; cultures from these also revealed the presence of the pneumococcus. In both patients the exudate was encysted and localized in the lower anterior abdominal region. The prognosis in these cases is favorable.

---

[1] Virginia Medical Semi-monthly, 1898, vol. iii., No. 14.

[2] Correspondenzblatt für Schweizer Aerzte, October 1, 1898.

In this connection I would call attention to an interesting case reported by Dr. Crozer Griffith[1] at a meeting of the Philadelphia Pediatric Society, March 4, 1899. A child, four years old, was taken acutely ill with symptoms closely resembling those of appendicitis, and was shortly afterwards sent by the attending physician to the Children's Hospital with that diagnosis. At an examination six days after the onset of the attack it was noted that the expression was anxious, the respirations were shallow and accelerated; there was no distention of the abdomen, but the recti were rigid, rendering palpation difficult; tenderness was distinctly marked in the right iliac region, but no mass could be felt. The temperature ranged between 103° and 105° F. Auscultation only revealed a few râles in the anterior part of the chest, but on the following day there were indications of consolidation in the left lung. Within another twenty-four hours the abdomen became soft, and no induration or tenderness could be detected. The case was clearly one of pneumonia. It ran a favorable course, without any return of the abdominal symptoms, and terminated in crisis on the tenth day. This case illustrates a type of pneumonia sometimes met with which may be called peritonitic, and is analogous to the types known as gastric and cerebral.

Gonococcic Peritonitis in girls is, fortunately, of rare occurrence. Cases have been reported by Cushing[2] and Rousseau.[3] It occurs as a direct extension of the vaginal inflammation, and may appear as a mild or severe acute general peritonitis, as a localized process, or as a chronic inflammation running a latent course. The prognosis is always serious. Even if recovery takes place, sterility, due to obstruction of the Fallopian tubes, may result. If the constitutional symptoms become severe and the pulse weak a laparotomy should be undertaken.

---

[1] Archives of Pediatrics, June, 1899.

[2] Bulletin of Johns Hopkins Hospital, May, 1899.

[3] Journal de Clinique et de Thérapeutique Infantile, vii., No. 4.

Katsurada[1] reports two cases of *purulent peritonitis caused by lumbrici*, or, at least, associated with the presence of these parasites in the peritoneal cavity. A very careful examination made at the abdominal section and afterwards at the post-mortem failed to reveal any other cause for the affection. The course of the disease in both cases was severe. Still states that the vermiform appendix is a common habitat of thread-worms, and thinks that they very probably breed there. In 200 autopsies on children thread-worms were present in the intestines in 38. In no less than 25 out of the 38 the worms were found in the appendix, and in 6 the appendix was the only part of the alimentary canal where the worms were found. In one case where pains had been complained of in the right iliac fossa the appendix contained numbers of thread-worms and was in a catarrhal condition. Still thinks that the catarrhal condition may have been directly due to the worms, and that symptoms closely simulating ordinary appendicitis may be associated with their presence.

In the treatment of this condition he recommends that santonin be given by the mouth, and that large injections of salt water or of an infusion of quassia be employed in the hope of reaching the small intestine. In my experience a prolonged course of some saline purgative taken every morning has relieved such symptoms in a very satisfactory manner.

Cholelithiasis in Infancy and Childhood. Until recently very little attention has been directed to this subject. Wendel[2] has contributed a very interesting paper on this affection, based on observations in sixteen cases occurring in children under eight years of age. He calls attention to the fact that the abdominal binder, as usually placed on new-born infants, interferes with the descent of the diaphragm, and thus tends to induce biliary stasis and to favor the invasion of the biliary passages by pathogenic micro-organisms. The disorder is more frequent than has been generally taught. Pain is so frequent a symptom of intestinal troubles in children that biliary colic is not thought of, and little attention is given to the inspection of the alvine and urinary discharges.

Still, at a meeting of the Pathological Society of London, April 4, 1899, also reported two cases of calculi of the gall-bladder in infants.

---

[1] Sei I Kwei Medical Journal, April 30, 1899.

[2] New York Medical Record, July 7, 1898.

In one, an infant of nine months, there was marked vomiting and stools of a clayey-white color, but without odor. Death took place from an unassociated cause, and at the autopsy he found eleven small calculi, black and friable, of which three were in the common duct. In another infant of eight months, which succumbed to an attack of tuberculous meningitis, there was neither icterus nor abdominal pain, but at the autopsy three small pigmented calculi were found in the gall-bladder.

Still said that he had been able to collect ten cases of cholelithiasis in infancy. The viscosity of the bile and the many circumstances which may lead to a stagnation of this liquid in infants, in his opinion, tend to the formation of these concretions. It is also possible that they may form during intra-uterine life.

Wendel urges that the surgeon should be on the watch to recognize abnormal conditions of the gall-bladder as well as a diseased appendix. A convenient method of palpation of the abdomen in the infant is to place it in a warm bath, as by this means the abdominal walls become relaxed and deep pressure may be made without exciting resistance. Persistent vomiting is an almost invariable symptom of gallstone colic. Convulsions are not infrequent, and in infants and young children vomiting, attended by convulsions and without fever, must always be considered as significant of some form of colic. Infants, however, suffer more frequently from nephritic than from biliary colic. Jaundice is generally slight and apt to be overlooked unless a careful urinary examination be made. In testing the urine for the presence of bile, to obtain a satisfactory result the urine should be evaporated to one-tenth its original volume.

The Condition of Fatty Liver in Children. Dr. Freeman, in a paper read before the American Pediatric Society, reported that he had made a careful examination of the condition of the liver present in those children upon whom autopsies had been made in the New York Foundling Hospital. He found that a condition of fatty liver existed in 41 per cent. of all the cases. The condition has no connection with the general nutrition of the infant, and it rarely occurs in the chronic wasting diseases such as marasmus, malnutrition, rhachitis, or syphilis, unless such condition be complicated by an acute disease. It is not found more often with tuberculosis than with other conditions, but it is most frequently met with in connection with gastro-intestinal diseases, acute meningitis, measles, and diphtheria.

AFFECTIONS OF THE UPPER RESPIRATORY PASSAGES.

Tracheocele. Few well-authenticated cases of tracheocele have been reported. Dr. J. Park West[1] records an instance of this affection in an infant, twenty months old, born in America of Polish parentage. When it was fifteen months old a small swelling had been noticed to the left and just below the level of the larynx. This occasionally disappeared, especially after a deep inspiration. There was nothing either in the family or in the previous history of the infant to afford any explanation for its occurrence. During the two months previous to its being seen by Dr. West the swelling had increased in size rapidly, and now it could not be made to disappear. Neither fluctuation nor crepitation could be detected. When the infant was quiet the tumor was soft. With ordinary respiration there was no change in its size, but on deep inspiration it became smaller, while with prolonged or restrained expiration, as in crying, it became tense and nearly double its ordinary size. An opening in the trachea could be felt just below the larynx. The thyroids were of normal size. Neither voice nor cry was altered.

Congenital Laryngeal Stridor. Avellis[2] reviews our knowledge of this condition, an affection first described by Dr. John Thomson, of Edinburgh. Up to the present its etiology remains obscure. The stridor may be noticed shortly after birth, and may persist for many months. Although it has been known to occur in more than one member of a family, the subjects of it appear otherwise quite healthy. There is considerable difference in the amount of stridor at various times; sometimes it may disappear altogether and be replaced by full, long, noiseless respirations; with the occurrence of sound sleep the stridor disappears. When the stridor is severe, considerable recession of the chest-wall and epigastrium may occur, and slight cyanosis may be noticed.

This affection appears to be quite distinct from laryngismus stridulus, with which it has been confounded. It does not appear to be associated with the presence of rhachitis, tetany, or laryngeal catarrh. Dr. Thomson regarded the condition as one of glottic spasm secondary to a central neurosis, but Avellis considers the hypothesis of a central neurosis unnecessary. The presence of a large thymus may in a few instances be an efficient cause. Avellis reports two cases presenting an aggravated form of this affection in which relief was obtained by surgical interference with the thymus.

---

[1] Archives of Pediatrics, April, 1899.

[2] Münchener medicinische Wochenschrift, July 26 and August 2, 1899.

Laryngeal Spasm. Eustace Smith[1] regards post-nasal adenoids as an important factor in older infants in the production of laryngeal spasm. Zimmerman[2] regards recurring spasmodic laryngitis as, in the majority of cases, an indication of the presence of adenoid vegetations in the nasopharynx; he states that in his experience the removal of these adenoids has almost invariably relieved the tendency to this affection in children. Both Rachford and Crandall[3] have also called attention to the frequency with which post-nasal adenoid growths are found in children who suffer from persistent cough, especially during the winter season; prompt and permanent relief generally follows their thorough removal. Each year adds to the gravity of the view taken regarding these growths in the nasopharynx and to the long list of ailments which may directly or indirectly be traced to their continued presence. (See Night Terrors, p. 268; also Incontinence of Urine, p. 260.)

The Status Lymphaticus. In my review of last year I referred to enlargement of the thymus gland as a possible cause of sudden death in infants, and briefly referred to the connection between hypertrophy of this gland and the status lymphaticus. Rolleston,[4] in a recent monograph, has given us an excellent summary of the present state of our knowledge on this subject. The thymus, which has been called the lymphatic gland of infancy, reaches its maximum development toward the close of the second year of life, and remains in a more or less stationary condition until the eighth year. A rapid atrophy generally sets in about the time of puberty, and its place in the adult is taken by a mass of fat and connective tissue lying over and adherent to the pericardium. The size and involution of the thymus, however, are subject to considerable variations; occasionally it persists into adult life. Little is known of the physiology of this gland beyond the fact that it appears to be an important centre for leucocytosis in the infant, and to this its enlargement in certain chronic and possibly toxic conditions, such as cretinism and exophthalmic goitre, may be due. Undue persistence of the thymus into adult life may be due to an actual hypertrophy of the gland, conditions difficult to be distinguished from one another. An enlarged thymus appears to be constantly met with in that peculiar diathetic state known as the status lymphaticus, or status thymicus, occasionally met with in infants and even in adults, in which, according to Escherich, a condition of latent irritability of the nervous system is present, and in which death may take place from cardiac failure without any apparently sufficient cause. The subjects of this diathesis have a pale, transparent skin and are well covered with fat. The tonsils, lymphoid tissue, and glands along the alimentary canal are hypertrophied; enlargement of the bronchial glands may sometimes be present (West[1]); the thymus and spleen are large; with these affections of the lymphatic system there is also a hypoplasia or insufficient development of the aorta.

---

[1] Lancet, August 27, 1898.

[2] Münchener medicinische Wochenschrift, 1898, No. 29.

[3] Archives of Pediatrics, September, 1899.

[4] The Diseases and Primary Tumors of the Thymus Gland. London, Medical Publishing Co., Ltd.

Rolleston states that more than forty cases of sudden death apparently due to enlarged thymus have been recorded, and he sums up our knowledge of the facts thus: An enlarged thymus may be found as a coincidence in cases of sudden death. It may mechanically cause compression of the trachea, especially when the head and neck are extended, and so give rise to asphyxia. It may mechanically compress the heart, or possibly the vagi, and thus lead to cardiac failure. An enlarged thymus may be only a part of the status lymphaticus, a constitutional condition in which death may follow apparently inadequate causes. It has also been suggested that an enlarged thymus may under certain circumstances produce and throw out into the circulation a toxic amount of the substance which has the power of lowering blood-pressure, and thus induce a fatal syncope. Osler refers to an instance apparently of this constitutional condition, in which death occurred during the administration of anæsthetics for adenoid vegetations. The possibility of this diathesis underlying, in children, the presence of post-nasal growths and enlarged tonsils, should always be borne in mind by the operator, as in it a fatal result will be liable to ensue.

AFFECTIONS OF THE RESPIRATORY ORGANS.

The Coin Test as an Aid in our Diagnosis. André Moussous[2] in an interesting paper calls attention to the value, in children, of the coin test in the diagnosis of pleural effusion and as an aid in distinguishing between the dulness due to pleuritic effusion and that of pneumonic consolidation. The writer has devoted several years to the study of this test, and feels assured that it constitutes in children a valuable addition to our ordinary methods of diagnosis. The percussion with the coin is to be practised at a point on the same side of the thorax, directly opposite to and on the same side of the thorax as the point where auscultation is made; the percussion should be made lightly, and the ear not used in auscultation should be covered. He has found that in the infant, as in the adult, the sound of the metallic click is obscured and muffled and loses its metallic character in traversing healthy lung. This transonance of sound is still more obscured when a pneumonic condition is present, and in some cases may be rendered inaudible. In the presence of a copious pleuritic effusion, on the other hand, the transonance is clear and distinct, and the metallic ring may readily be recognized. When the effusion is slight in amount or only local in its extent the transonance is less perfect. The failure to transmit the metallic ring in its purity may, according to Moussous, be due in some instances to old pleural adhesions or to abdominal distention producing an upward bulging of the diaphragm and thus preventing an even distribution of the liquid. The transonance, however, is always better on the side of an effusion than on the normal side, and thus presents a marked difference from the transonance obtained when a pneumonic consolidation exists.

---

[1] Archives of Pediatrics, September, 1899.

[2] Revue Mensuelle des Maladies de l'Enfance, January, 1899.

Method of Obtaining the Sputum of Infants. It is regarded as almost imposibble under ordinary conditions to obtain the sputum of infants and young children for examination. Ebstein directed his house physicians to pass, just at the end of a fit of coughing, a curved forceps armed with absorbent cotton into the fauces, and collect the expectoration before it could be swallowed. Meunier, in a paper read at the Fourth Congress for the Study of Tuberculosis, Paris, 1898, recommends that simple lavage of the stomach should be practised in young children early in the morning, shortly after the fit of coughing that almost always occurs on waking. By this means sputum may be obtained; if purulent it may be readily distinguished, and tubercle bacilli can be sought for by the usual methods of examination.

Treatment of Bronchopneumonia. J. A. Coutts[1] writes that he has found belladonna of great value in the treatment of this affection in children, and that under it the dyspnœa is speedily relieved, the temperature falls rapidly, and the affection runs a much shorter course than under our ordinary methods of treatment. Out of sixty cases treated by this plan, death occurred in only two. He recommends giving the drug in doses sufficient to produce some physiological effects. Dr. Hodghead[2] has also obtained satisfactory results from this method of treatment. He advises its use in small doses repeated frequently until the characteristic action of the drug is noted. To children under five years he gives two drops of the tincture every hour until flushing of the skin is noted, and then reduces its frequency. He thinks it is especially called for when the bronchial secretions are abundant. While of the opinion that, carefully administered, this drug may be of distinct value, I should hesitate to employ it in too heroic doses. It is to be remembered that belladonna in excessive doses is both a respiratory and cardiac depressant.

---

[1] British Medical Journal, January 28, 1897.

[2] Pediatrics, September 1, 1899.

Pleural Effusion. In a discussion on the treatment of pleural effusion in children at the meeting of the British Medical Association, August, 1899, the following interesting points were elicited. Dr. Robert McGuire, referring to the signs of pleuritic effusion, emphasized the fact that, owing to the yielding character of the ribs, there is less tendency in young children than in adults to the development of a positive intrathoracic tension. This is especially true when the effusion is serous. Purulent effusions are apt to be more abundant and may produce marked indications of tension. Symptoms of much displacement of neighboring viscera he regards, therefore, as probably indicating the presence of pus. Tubercle is rarely the cause of effusion in children. Should a case be tubercular it is questionable how far it is desirable to remove the fluid. The important indication in these cases is to maintain the general health.

Dr. G. F. Still insisted that it was important that the fluid should not be drawn from the chest too rapidly. After rapid removal in the adult serous expectoration may occur, and may be so profuse as to endanger life. Such cases have not as yet been reported as occurring in young children; but recently, in the Great Ormond Street Hospital, there had been very profuse expectoration for some hours after aspiration in a child of ten years. When once it has been determined that a pleuritic effusion is purulent, Still advises its removal as soon as possible. To defer operation is dangerous, as in these cases constitutional infection is found to be the most common cause of death. In twenty-eight consecutive autopsies of cases of empyema it was found that in eleven cases suppurative pericarditis had occurred, in five cases suppurative meningitis, in four cases suppurative peritonitis, and in one case there was suppurative arthritis. Pure cultures could be obtained from all these foci.

Speaking on the subject of irrigation of the pleura, Mr. Tubby said that we had long been aware that during irrigation of the pleura fatal symptoms might arise suddenly. He had made experiments on this subject, and believed that the amount of pressure with which an irrigation is given is important. Too great force produces an almost instantaneous fall in blood-pressure, which may be fatal. In some cases there appears also to be an intensely sensitive pleural reflex, which induces a sudden fall in blood-pressure, with stoppage of the heart. It is impossible to tell beforehand when sudden syncope may occur, and he therefore objects to irrigation under all circumstances, even in cases of fetid effusion.

Hemorrhage Following Exploratory Puncture of the Chest. Exploratory puncture of the chest for diagnostic purposes is usually regarded as an entirely harmless proceeding. Koplik, however, records four cases in which hemorrhage occurred on the withdrawal of the needle. It appears as if the needle must have entered the lung, directly wounding some vessel, for on the withdrawal of the needle a fit of coughing ensued and the blood, mingled with frothy sputum, came from the lips and nose in a spurt. In none of these cases was there any collapse or syncope, but there were marked symptoms of distress. A similar experience had been encountered in the experimental laboratory, and in small animals such a hemorrhage had produced asphyxia mechanically. Koplik states that the exploring needle should not be used except for sufficient reason; that it should always enter at the point of greatest flatness or dulness; that it should not be introduced too deeply, and that it should not be entered and then withdrawn and pointed up or down in quest of pus.

Pneumothorax in Young Children. Pneumothorax is very rare among young children; when it does occur it is generally due to rupture of an abscess into the pleural cavity. It has been stated, however, that whooping-cough may bring about this condition, but such a sequel is so uncommon that a well-authenticated case in which this affection appeared to be directly the result of overstrain of the lung, produced by an attack of coughing, is worth recording. Dr. Villy[1] records this case and the autopsy which followed. Apparently a small rent had occurred on the anterior surface of the root of the lung in the fissure between the middle and lower lobes. Nothing more could be made out, and there were no signs of any pathological conditions being present beyond those due to collapse. Larynx, trachea, bronchial tubes, and œsophagus were all normal.

DISEASES OF THE CIRCULATORY SYSTEM.

Diagnosis of Congenital Disease of the Heart. Dr. Crozer Griffith, in an address before the Philadelphia Pediatric Society, strongly urged the desirability in congenital heart disease of attempting to ascertain the nature of the lesion. This is always difficult, and in many cases perhaps impossible, but not infrequently a tolerably correct conception of the lesion present may be arrived at. The following points are to be borne in mind: Cyanosis may in a few cases be due to an abnormal origin of the vessels, but in such case it is apt to be extreme, and the duration of life is always short. Much more frequently, as was pointed out years ago by Stillé, is it due to stenosis at the pulmonary valve, and the presence of a murmur at the pulmonary cartilage would render additional confirmation of the supposition. Pulmonary stenosis is of necessity attended by a feeble pulmonary second sound, on account of the small amount of blood entering the pulmonary artery. Should this sound be accentuated a probable explanation is that the ductus arteriosus has remained patulous, and the blood from the aorta to some extent enters the pulmonary artery and augments the lowered pressure there. When this duct is sufficiently patent to allow blood to pass in amount sufficient to thus alter the pressure in the pulmonary artery, a systolic murmur is generally produced, audible in the same area as is the murmur of pulmonary stenosis, but differing from it in its diffusion; the murmur of pulmonary stenosis is not carried far from its seat of origin, while that of a patulous ductus arteriosus is apt to be carried along the course of the aorta and into its main branches. In congenital cases, where a narrow pulmonary orifice exists and the free exit of blood from the right ventricle is more or less impeded, the blood, in its effort to escape from the right side of the heart, may either find a passage through a patulous foramen ovale or through a perforation in the septum ventriculorum. The former lesion is not generally attended by a murmur; should any be present, it will probably be diastolic in time. A perforation in the septum ventriculorum is generally accompanied by a loud murmur heard over the mid-sternum and carried to the left, the direction in which the blood is passing. The area is that in which a murmur of tricuspid regurgitation would be heard, but its diffusion would be different and the other symptoms of such a lesion would be wanting. As is well known, this is the combination of lesions that most frequently occurs. Nevertheless, in congenital heart disease no diagnosis should be made on the probability of occurrence.

---

[1] Medical Chronicle, July, 1899.

The Præcordial Area in Children. William J. Butler[1] gives us the statistics of his investigations on the normal area of the præcordium in children over seven years of age, which were carried on at Professor Cotton's clinic at Rush Medical College, Chicago. He states that with a child in the erect posture he found that on the upper border of the heart relative dulness began in the second interspace in 42 per cent. of the cases and at the third rib in 52 per cent. of the cases. Absolute dulness commenced at the third rib or third interspace in 20 per cent. of the cases and at the fourth rib in 80 per cent. of the cases. On the right border of the heart, on the line of the fourth interspace, absolute dulness commenced invariably on the left sternal border; the relative dulness commenced in 52 per cent. of the cases from one to one-and-a-half finger-breadth to the right of the right sternal border and in 22 per cent. of the cases at the right border of the sternum. In 20 per cent. of the cases no relative dulness was observed. In 33 per cent. of the cases relative dulness became less marked in the recumbent posture. In the erect position the apex was noted in the fifth interspace in 78 per cent. of the cases and in the fourth interspace in 10 per cent. of the cases. Of those that were in the fifth interspace, 27 per cent. were inside the nipple line, 47 per cent. were closely on the nipple line, and 26 per cent. were outside the nipple line. When the apex-beat is in the fifth interspace in the erect posture it generally ascends behind the fifth rib or into the fourth interspace in the recumbent posture. In 31 per cent. the pulmonary second sound was louder than the aortic second sound; in 5 per cent. the aortic sound was louder than the pulmonary. Accidental systolic murmurs were heard in 31 per cent. of the cases, and of these 83 per cent. were heard loudest over the base and 17 per cent. over the apex. The liver dulness commenced at the lower part of the fifth interspace or at the sixth rib in 70 per cent. of the cases and at the fifth rib in 30 per cent. of the cases. The writer emphasizes Sahli's statement that too much reliance must not be placed upon relative heart dulness in children.

---

[1] Pediatrics, March 15, 1899.

Endocarditis of Tonsillar Origin. A brief reference should be made here to the paper read at the meeting of the Association of American Physicians by Dr. F. A. Packard, of Philadelphia, in which he reported five cases of endocarditis, each apparently a sequence of an attack of tonsillitis. In two of the cases it was certain that prior to the attack of tonsillitis the heart had been sound, and it was presumably sound in the other three instances.

Pericarditis in Children. Baginsky,[1] in a review of pericarditis in children, expresses the opinion that the frequency and danger of this affection is usually understated. Out of 4500 cases admitted to the hospital in Berlin, pericarditis was present in 66. Of these 66 cases 24 were associated with rheumatism, 11 were tuberculous, 11 had pleuropneumonia, 7 erysipelas, 6 empyema, 5 severe gastro-enteritis, and in 6 cases the pericarditis followed an attack of measles. In 20 cases the disease occurred in infants under one year old. In infancy there appears to be a marked tendency for the exudation to be purulent. In 13 cases the effusion was serous in its character, and in these the symptoms were well marked and the physical signs were distinct. The area of dulness in the child does not correspond exactly to the triangular shape it usually assumes in the adult, but in the very young it has more the shape of a cone with convex sides, and in older children the form of an ovoid pointed toward the apex of the heart; changes in the position of the little patient may, however, produce changes in the area of dulness. An associated area of dulness may generally be found in the posterior wall of the thorax, a fact pointed out by Ewart, of London. In itself, serous pericarditis in children is not a malignant affection, and is only rendered grave by complicating conditions. In twenty cases the effusion was purulent; in four of these the effusion was associated with tuberculosis, and in three the condition followed measles. In 11 instances the patients were under the age of one year.

---

[1] Berliner klinische Wochenschrift, November 28, 1898, and Klinische therapeutische Wochenschrift, 1898.

The diagnosis in purulent pericarditis may be very difficult, for the exudation is, as a rule, small in amount. The constitutional symptoms are severe and the fever generally assumes a septic character, but at the same time the physical signs are not marked and the area of cardiac dulness may show little change from normal. Purulent pericarditis occasionally makes its appearance at a very early age. Baginsky lost an infant only ten days old from this affection, in whom the disease ran an apyrexial course.

The prognosis is most grave, but Baginsky thinks that surgical interference, especially in the cases associated with pleural empyema, may offer some hope. Tuberculous pericarditis is a rare occurrence in tuberculosis; if it does take place, however, the prognosis becomes grave. Baginsky has observed eleven cases, but in only six was there actual tuberculosis of the pericardium. When this condition is present the physical signs are well marked and the constitutional symptoms severe; but when the pericarditis is a complication of the general disease the symptoms are generally latent. Perhaps the most important variety of pericarditis is the fibrinous, which may be acute or chronic. In fifteen of Baginsky's cases the disease was acute, and nine of these were fatal. The clinical course varies with the nature of the underlying disease and the age of the individual. In young children the disease may be almost without symptoms; in older children, however, the symptoms are characteristic. The cardiac area is enlarged, and friction-sounds may be present. The heart-sounds are muffled, and may early in the disease be accompanied by endocardial murmurs. Amelioration may in some instances be deceptive; in two of Baginsky's cases sudden death without warning occurred during apparent convalescence. The chronic form of the affection leads to obliteration of the pericardial sac and great cardiac hypertrophy. The fibrous tissue formed may also contract around the roots of the great vessels, and thus lead to narrowing of their calibre, with serious after-results.

TREATMENT. Baginsky thinks that the salicylates and kindred remedies have little influence on the cardiac and especially on the pericardial complications of rheumatism. In some cases ice at the onset of the affection may be applied externally, and when heart-failure threatens digitalis or strophanthus may be of service. When the urine is scanty theobromine sodio-salicylate may be combined with these drugs.

Indurative Mediastinitis. Sequeira[1] reports a case of indurative mediastinal pericarditis in an infant aged fifteen months. Two months previously it had suffered from an attack of bronchitis. Four weeks afterwards œdema of the face and legs was noticed. On admission to the hospital the child was pale and cried constantly; the feet and legs were cold and pitted slightly on pressure; thoracic movements and auscultatory sounds, including those of the heart, were normal; the upper area of cardiac dulness extended to the second interspace, and the right border extended beyond the middle line of the sternum; the urine was normal. Ten days after admission the edge of the liver was found to extend two and a half inches below the costal margin. Shortly afterwards ascites appeared, albumin was found in the urine, profuse diarrhœa set in, and death very soon followed. The autopsy revealed a great thickening of the mediastinal tissues; the anterior mediastinal glands were enlarged and caseated; the left lung was adherent to the chest-wall, and the pericardium was greatly thickened, fibrous, and adherent throughout to the heart; firm adhesions united the pericardium with the thickened anterior and posterior mediastinal tissues; the valves of the heart were healthy, but both ventricles were dilated and hypertrophied. No signs of tuberculosis were found. This case is one of the youngest on record, and its history is an illustration of the insidious commencement of this disease and of the fact that among the earliest symptoms which attract attention are those of the secondary cardiac dilatation and dropsy.

---

[1] Lancet, December 31, 1898.

Whipham[1] reviews thirty-six cases of chronic mediastinitis which he has collected from literature. It has been stated that the disease is more frequent in children than in adults, but his statistics show the contrary to be the case. There seems to be no particular antecedent affection which can be regarded as especially causative; but, although it appears to follow a large number of conditions, the frequent association of chronic peritonitis is remarkable. The condition of the heart shows no constant lesion. It is not improbable that inflammatory processes beginning early in life, outside the heart itself, may lead to the chronic thickening of the pericardium and to obliteration of the cavity of the heart with arrest of its development.

Rolleston[2] thinks that in some cases the affection may start in the thymus gland. The pericardium is usually more or less affected; in the majority of cases it is either partially or entirely obliterated by fibrous adhesions. The pleura appears to be affected to a lesser degree. The condition is not associated with any structural change in the kidneys. Antemortem DIAGNOSIS is extremely difficult, but among the more important clinical symptoms are prominence of the veins of the arms and neck, puffiness of the face and thorax, duskiness of the cheeks and tongue, and the presence of ascites.

---

[1] Lancet, April 8, 1899.

[2] The Diseases and Primary Tumors of the Thymus Gland. London, Medical Publishing Co., Ltd.

TREATMENT is of little value. Whipham emphasizes the importance of keeping children convalescent from rheumatism at rest until all possibility of endocardial or pericardial inflammation has ceased.

Aneurism of the Aorta in the Infant. Among the very interesting and most unusual lesions of the circulatory system in infants is a case of aneurism of the aorta in a child of ten months, reported by Bertram Rogers.[1] The child's family history was good, and there was no previous condition that could be assigned as a cause. The infant was very anæmic, and a loud, rough systolic murmur could be heard all over the cardiac area, but was loudest over the pulmonary region. The child died suddenly of cardiac failure. At the autopsy indications of recent pericarditis were noticed, and the aortic valves were glued together. About half an inch above the semilunar valves was a ragged hole, two to three inches long, passing upward. This was the opening of a small aneurism which passed forward and appeared between the top of the right auricle and the pulmonary artery. No disease was found in any other organ.

Aneurisms in children are extremely rare. In the majority of cases they are associated with disease of the aorta, but their exact etiology is uncertain.

DISEASES OF THE URINO-GENITAL TRACT.

Incontinence of Urine. Incontinence of urine is one of the troublesome affections of childhood of which the exact causation is often obscure and the treatment usually difficult. During the past year several papers have appeared on this subject which are valuable as emphasizing facts likely to be forgotten by the physician. Dr. James McKee[2] considers that the majority of cases of functional enuresis are dependent upon faulty metabolism, and advises that treatment be directed to the correction of the underlying morbid states.

Huber[3] writes that although the affection is met with in various conditions, frequently in the weak and anæmic and occasionally in apparently robust children with well-developed muscles, underlying all is the one common factor—a neurotic constitution, either acquired or inherited. This condition is rendered still more important by the presence of more or less anæmia. In some instances, indeed, the affection is to be regarded as a simple neurosis, but in the greater number one or more additional etiological factors keep up the annoyance and must be removed before improvement takes place. Frequently, notwithstanding the most careful search, these exciting factors cannot be discovered, but when they are found the treatment becomes simple and more satisfactory. Among the more noteworthy conditions which Huber emphasizes as frequently producing or maintaining this affection are lack of tone in the sphincter, with defective innervation; chronic inflammation at the prostatic portion of the urethra and the neck of the bladder; an abnormally small bladder, which may be either a congenital defect or an acquired one if the incontinence is of long standing; and the presence of adenoids in the nasopharynx. These latter impair nutrition and lessen will-power, and consequently control over the vesical sphincter, besides inducing an irritable condition of the nerve centres owing to the resulting defective aëration of the blood.

---

[1] Pediatrics, August 15, 1899.

[2] University Medical Magazine, vol. x., No. 3.

[3] Archives of Pediatrics. November, 1899.

Causes of Incontinence. In the accompanying table an attempt has been made to classify the causes of incontinence:

1. Malformations		Small meatus, small bladder (natural or acquired). Hypospadia (perineal). Exstrophy of bladder. Epispadia.
2. Organic disease of nervous system		Idiocy, cerebral palsy, meningitis, chronic hydrocephalus, myelitis, injuries of cord, Pott's disease with compression or inflammation of cord.
3. Functional (?) disorders		Epilepsy, chorea, diabetes (mellitus and insipidus). Hysteria, neurasthenia, anæmia resulting in defective innervation and poor muscular development.
4. Weak sphincter		*a.* Infantile condition persisting. *b.* General muscular incompetency, or *c.* Result of exhausting diseases, lowered vitality, general anæmia.
5. Irritability of bladder	*a.* Inflammatory processes	Urethritis, balano-postitis, vulvo-vaginitis, cystitis, nephritis, pyelitis, rectal catarrh, chronic inflammation of the prostatic portion of the urethra and neck of bladder due to masturbation.
	b. Local	Stone, polypoid excrescences at neck of bladder, hyper-acid urine, excess of urates, oxalate uric acid, concentrated urine, excess of phosphates due to digestive disturbances and imperfect assimilation. Bacteriuria.
	c. External (reflex)	Periurethral and perivesical inflammation; phimosis, preputial adhesions and balano-postitis, urethral inflammation, vaginal catarrh, rectal catarrh, irritation due to pin-worms, constipation, hardened feces in rectum, fissure, and polyps of the rectum.
	d. Distended bladder	Excessive secretion of the urine due to large amounts of fluids ingested; diuresis due to drugs, alcohol, tea, coffee, etc.

6. Deficient innervation	Emotional	Mental excitement, eager play; fear of darkness or cold room; wilfulness; bad habits.
	Auto-suggestion	The child having wet the bed, and having been scolded or punished, the habit continues through fear. Dreams.
	Undue excitability of sphincter	Neurotic state. Masturbation. Sleeping on back.
	Enfeeblement of will	Anæmia, hysteria, neurasthenia. Lymphatism (adenoids).

TREATMENT. Both McKee and Huber emphasize the fact that the general health of the child demands our first consideration. Careful hygiene, tonic treatment, massage, cool baths or cold douching of the spinal region, and regular out-door exercise with a moderate amount of gymnastics, are all to be advised. The evening meal should be a light one, given two hours before bedtime; fluids should be restricted, particularly in the evening; the bowels should be evacuated and the urine passed before going to bed, and, in addition, the patient should be roused once or twice during the night to pass urine. Cod-liver oil, iron, and strychnine are the most efficient remedies to improve general nutrition. Belladonna is demanded in almost every case; in the case of both strychnine and belladonna the dose should be gradually increased till the point of tolerance is reached.

Retention of Urine in Children Due to Spasm of the Sphincter Vesicæ. Kuttner[1] reports two cases, in children, in which there was retention of urine due apparently to spasm of the sphincter. The first case was that of a boy, eight years of age, who was said to have suffered when only six months old from a sudden retention of urine which required the use of a catheter. Attacks similar in character occurred when at the age of two and a half years, three, four, and five years, micturition in the intervals being perfectly normal. When seen there was a persistent difficulty in micturition, which was most marked in the morning; at this hour the patient was unable to empty his bladder without strong pressure and pain; during the day the flow was easier. The trouble was at this time regarded as of nervous origin, but as the condition grew markedly worse an examination of the urethra was made and a narrowing discovered, permitting with difficulty the passage of only a No. 8 catheter. Dilatation, however, was easily accomplished. Kuttner regarded the case not as one of congenital stricture, but of chronic spasm of the external sphincter. There had been no return of the difficulty at the time of writing. The second case was that of a girl, seven years of age, who, for as long as her mother could remember, was troubled day and night with frequent micturition. There was no pain with the act. On examination a distended bladder was detected, and on the introduction of the catheter a large amount of urine similar in character to residual urine was drawn off. In this case also Kuttner found a distinct spasm of the sphincter, which, in his opinion, explained the condition. Gradual dilatation was practised, and a complete cure was obtained in a few weeks.

---

[1] Berliner medicinische Wochenschrift, 1898, vol. xxv.

Cystitis. Cystitis may occur during infancy and older childhood, but thus far has not received much recognition. Attention has been recently called to instances where the affection has been met with in nurslings, owing to an infection by the bacillus coli. The source of the infection appears to have been most frequently from without. Escherich[1] was the first to describe a condition characterized by frequent micturition, pain, and strangury, with acid urine containing numerous colon bacilli. The patients were almost invariably girls, and their ages varied from a few weeks to nine years. Finkelstein[2] records nine cases, seen in Heubner's clinic in Berlin, of nurslings between five and nine months of age who had been much prostrated by previous disease. This writer attributes the infection to an invasion through the urethra of bacilli from fecal matter at a time when the mucous membrane of the bladder was in a weakened condition. In this opinion he is confirmed by Hutinel,[2] who emphasizes the fact that cystitis is especially liable to occur when any inflammatory trouble exists in the rectum. Cystitis in infants generally runs a comparatively latent course, and manifests itself only by turbid urine of acid reaction, containing numerous colon bacilli; very rarely are the symptoms severe; death may take place from constitutional infection.

Treatment. In general, cystitis in infants and young children is very amenable to treatment. This should consist of warm baths, hot applications to the hypogastrium, and the administration internally of bland diuretics. The dietary should consist chiefly of milk. Older children should be strictly confined to their beds. When pus is present in the urine irrigation of the bladder should be performed, either with a weak boric acid solution or with a solution of lysol, 1:400. Hutinel advises that this lavage of the bladder be continued until all signs of pus have disappeared from the urine.

Tubercular Cystitis is very infrequent in young children. Garrow reported a case, at a meeting of the Montreal Medico-Chirurgical Society, in a child of three years, which afterwards died of general tuberculosis. Morin[1] states that this affection in children may be met with either as a primary or as a secondary lesion. The pain is generally much less severe than in adults, and hæmaturia is rare. Pyuria and incontinence are the two principal symptoms. In some instances there appears to be a tendency to spontaneous cure.

---

[1] Société des Médecine de Styrie, February 26, 1894.

[2] Ueber Cystitis im Säuglingsalter, Jahrbuch für Kinderheilkunde, 1896.

[3] Cystites coli-bacillaires chez les enfants, La Presse Médicale, November 18, 1896.

[4] Revue Internationale de Médecine et de Chirurgie, vol. ix., No. 10.

Treatment. Cumston[1] outlines the following treatment: Internally, cod-liver oil, preparations of creosote, and general tonics are of value; locally, an emulsion containing iodoform or guaiacol may be injected into the bladder and be retained until expelled. If the ulcerations are extensive they may be cauterized and curetted. As a direct local application he recommends lactic acid, having been led to try this agent owing to the favorable results obtained from it in tuberculous laryngitis. Both Morin and Cumston recommend, under certain conditions, a suprapubic incision in order to treat the mucous membrane directly. Cumston says that if only as a palliative measure the relief that it affords from pain is in some instances quite enough to justify its performance.

Thigh Friction in Young Infants. In a paper read before the Philadelphia Pediatric Society, March 14, 1899, Dr. Crozer Griffith[2] refers to this method of masturbation in infancy, if such it can be called, and thinks its occurrence is frequently overlooked by physicians and parents. Text-books say very little about it. Townsend, at a meeting of the American Pediatric Society, May, 1895, reported five cases. Since then others have reported similar instances, and it is inferred that they are not as infrequent as had been supposed. In the cases seen by Dr. Griffith careful examination revealed nothing abnormal with the child's genitals beyond a slight irritation, which appeared to be the result, rather than the cause, of the irritation. Others, however, have reported the existence of adhesions to the clitoris which they regard as important owing to the irritation produced by retention of the secretions. Thigh friction at this early age should not be regarded as evidence of any moral obliquity nor of a special development of the sexual passions; but it may, if allowed to go on unchecked, lead to the formation of a habit which must have disastrous results.

TREATMENT. It is necessary to remove all sources of nerve irritation; the strictest cleanliness should be maintained, and if the surfaces appear inflamed the use of mildly astringent washes and ointments is indicated. Attempts to separate the thighs or knees by means of any mechanical apparatus, so that friction is impossible, have not proved of any service. Constant watchfulness on the part of the parents is absolutely necessary.

---

[1] Boston Medical and Surgical Journal, December 22, 1898.

[2] Archives of Pediatrics, May, 1899.

AFFECTIONS OF THE NERVOUS SYSTEM.

The Plantar Reflex in Children as an Aid in Diagnosis. In recent medical literature attention has been called to the state of the plantar reflex as an aid in the diagnosis between functional and organic affections of the nervous system. Babinski, in a communication to the Société de Biologie, February, 1896, and in a later paper in the *Semaine Médicale*, July 28, 1898, stated that whereas in the normal subject excitation of the sole of the foot evokes, among other reflex movements of the limbs, flexion of the toes on the metatarsus, in certain pathological conditions of the nervous system extension instead of flexion follows stimulation of the plantar surface. This altered response is said to be an indication of some pathological condition in the pyramidal system. It is notably in the great toe or the first two toes that the extension has to be looked for, as normal flexion may predominate in the second or third outer toes. This extensor response when present is best evoked by excitation of the outer border of the plantar surface; whereas the normal reflex response is most readily elicited by stimulation applied to the inner part of the sole. In testing for this reflex it is essential to have the muscles of the foot and leg absolutely at rest—a condition best obtained by slight flexion of the leg on the thigh, the foot resting on its outer border, on the bed; the patient's eyes, at the same time, should be closed.

In an interesting paper Dr. Collier[1] confirms Babinski's conclusions, and makes some useful additions to our knowledge. He states that in early infancy the reflex differs from the response obtained in the adult, and manifests itself by a drawing back of the great toe, followed by extension and spreading out of all the toes, with eversion of the foot and flexion of the ankle. This form of response persists until the child is able to walk, when the normal adult response is gradually substituted. During sleep the plantar reflex is diminished, and in some children, even up to the age of twelve years, the infantile extensor response may be obtained while they are asleep; although in the same, when awake, the adult flexor mode of response takes place. In pathological conditions of the pyramidal system in children the extensor response is obtained; but the extension differs from the extensor response in the normal infant in being more slow, but more certain. Extension of the great toe precedes all other movements, and when the reflex is very sluggish it may be the only response obtained. The characters of the normal, subnormal, and infantile modes of response are set forth in a table by Collier, as follows:

---

[1] Brain, Part I., p. 71.

	Normal.	Extensor response.	Infantile response.
Movement	Quick.	Often deliberate.	Quick.
Muscle first to contract with a minimal stimulus	Tensor fasciæ femoris.	Extensor proprius hallucis.	Extensor of toes.
Certainty of response to each stimulus	Less certain.	Certain.	Less certain.
Position of toes	Flexion; adduction.	Extension; spreading.	Extension; spreading.
Obtained more easily by stimulating	Inner part of sole.	Outer part of sole.	
Movement of ankle . . .	Dorsiflexion and inversion, both conspicuous.	Dorsiflexion and inversion, both slight.	Dorsiflexion and eversion, both conspicuous.

Collier found the extensor response present in 34 out of 36 cases of myelitis, and in 28 out of 30 cases of disseminated sclerosis. In 28 out of 36 cases of hemiplegia the extensor response was elicited on the paralyzed side, while the flexor response was present on the unaffected side; in 3 cases the extensor response was present on both sides. Six cases of Friedreich's disease all showed an extensor response. In 38 out of 40 cases of epilepsy the flexor response was obtained, although after every fit in which convulsions were severe the extensor response was temporarily elicited. The flexor response was present in twenty cases of chorea; it was also present in twenty cases of acute poliomyelitis and in six cases of myopathy, and was only diminished or lost in proportion to the degree of paralysis of the muscles concerned in the response. The reflex was normal in neurasthenic conditions and in sciatica. In patients treated with large doses of strychnine it was noted that the plantar reflex becomes changed so as to resemble that met with in lesions of the pyramidal system.

Kernig's Sign in Meningitis. In my review of last year I referred to this sign, which, although first given to the profession in 1884, appears to have attracted little notice until Netter, in 1898, again called attention to it. In a paper read before the Association of American Physicians Dr. T. J. Herrick, of Chicago,[1] stated the results of his observations on this symptom. In nineteen cases of undoubted meningitis Kernig's symptom was present in seventeen. In the two children in which it was absent the single examination was made very shortly before death —a period when marked relaxation of all the muscles is frequently noted and when even the rigidity of the neck muscles may entirely disappear.

---

[1] American Journal of the Medical Sciences, July, 1899.

In many instances its presence was of distinct value from the paucity of the other evidences of meningitis, and in one case of miliary tuberculosis its presence at the last was of special interest, as at the first it was absent, and it only appeared when other indications of meningeal involvement became manifest. The technique of eliciting this symptom is extremely simple. The thigh has first to be brought at right angles with the line of the body, and then extension of the leg on the thigh is to be attempted. Should meningitis be present, complete extension cannot be made. Not infrequently in delirious patients not suffering from meningitis a little patient force must be used before the jerky and tense muscles yield. The same is true of some spastic conditions; but where Kernig's contracture is present even considerable force will not cause the muscles to yield, and the attempt may be distinctly painful. No thoroughly satisfactory explanation of the phenomena has been offered.

Chorea. Dr. J. W. Russell[1] has recorded the results of an investigation into the *handwriting in chorea*, and finds that, through the changes produced in it, cases of chorea may be separated into five different classes. In the first class the writing progresses by snatches, and each written word represents a number of detached motor acts. In these patients voluntary action is distinctly interfered with, but there appears to be a certain amount of power to inhibit the choreiform movements for a short time, so that the individual lines, even in bad examples of handwriting, rarely show the amount of irregularity which would be expected. In the second group those patients are included who can write a word of even six or seven letters with considerable steadiness. In these there is more or less complete temporary control over the choreic movements. In a third group he finds that even in the absence of distinct choreiform movements on the right side, writing is distinctly interfered with, and inco-ordination is manifested. In a fourth class the choreiform movements were very severe, and yet the right hand became steady when the pen was held; the resulting writing, however, was quite unintelligible. In these, although control over the choreiform movements was present, there was marked inco-ordination. The last class is composed of cases where some intellectual defect is regarded as responsible for the inability to write; although the choreic movements were moderate, there was complete inability.

Dr. J. P. Stewart[2] calls attention to the *sensory phenomena* occasionally observed in chorea. Hemianæsthesia is present on the side of the body in which the choreic movements are most marked. This anæsthesia is, however, only slight, and for its detection requires careful comparison of corresponding points on opposite sides of the body. In one of his cases there was also marked diminution in the acuity of the senses of smell, taste, and hearing on the choreic side. The reflexes are also more or less altered; the superficial reflexes will be found diminished in those cases where hemianæsthesia exists. In a certain number of cases a choreic knee-jerk is demonstrable; it differs from the healthy knee-jerk in that when the patellar tendon is tapped, instead of producing a brisk contraction of the quadriceps extensor, followed by a sudden relaxation, the knee is suddenly extended to its full extent and remains so for a second or two, the foot and toes meanwhile exhibiting irregular movements.

---

[1] Lancet, April 1, 1899.

[2] Edinburgh Medical Journal, 1899, vol. lxvii.

TREATMENT. In the treatment of chorea Dr. J. P. Stewart[1] and Dr. W. E. Winter[2] both lay much importance upon securing for the patient at the beginning of an attack absolute rest, both physical and mental. Rest in bed is insisted upon, even in mild cases, for several weeks, and when the patient is allowed up the time for being up should be lengthened gradually. Of great importance also is an ample and nutritious dietary. Of drugs, antipyrine is recommended in the early stage of an acute attack, and arsenic in the later stage and in the more chronic forms of the disease. Toleration of arsenic is generally easily secured if the drug be not given in too large doses at first and if the dose is not increased too rapidly. Administered for a lengthened period, arsenic may not only induce a brownish pigmentation of the skin, but may occasionally give rise to an intractable peripheral neuritis. Winter thinks that this is not likely to occur if the patient be kept in bed. In very violent cases chloral may be exhibited until the patient is rendered drowsy, but Stewart advises caution in its use, as in some instances the chloral sleep has been followed by noisy maniacal excitement.

On the Etiology of Convulsions in Children. At a discussion on the causation and treatment of convulsions in children at the meeting of the British Medical Association, August, 1899, a few interesting statements were made. Dr. Coutts[3] stated that the frequency with which convulsions occurred at the onset of febrile diseases has, in his opinion, been overestimated. Careful investigation showed that in croupous pneumonia convulsions were present at the onset in less than 5 per cent. of the cases. In the exanthemata convulsions are more frequent during the course of the disease than at the onset, and are due to well-recognized causes. The idea that convulsions in a child are the equivalent of rigor in the adult is contrary to facts. Peripheral irritation, such as teething, is often considered as an efficient cause, but more importance should be given to the underlying predisposing cause, such as a rhachitic diathesis and a neurotic constitution; a severe injury, however, such as a burn, may give rise to convulsions apart from any predisposing cause. The convulsions seen in dying infants are probably due to a condition of asphyxia. The liability of neuroses to subsequently appear in children who have suffered from convulsions has been underestimated. Dr. Gossage stated that out of 85 cases in which he had been able to trace the later history of the patient up to an age varying from eleven to twenty-three years he found that 40 were the subjects of definite nervous affections; 15 suffered from epilepsy, 5 from somnambulism, 3 from attacks of melancholia, 6 from chorea, and 9 from megrim. Of the remaining two, one suffered from somnambulism at first and hysteria afterward; the other from somnambulism at first and from melancholia later. Of the 45 reported free from neuroses 8 were said to be eccentric, and the majority of them below their brothers and sisters in intelligence. Of these 85 patients it is to be noted that in 71 there was a distinct neurotic family history.

---

[1] Edinburgh Medical Journal, 1899, vol. lxvii., No. 3.

[2] Treatment, 1898, No. 17.

[3] Pediatrics, October 15, 1899.

Night-terrors in Children. This distressing symptom has been referred by different writers to various causes. The majority of our text-books emphasize the importance of disorder in the alimentary canal as an important factor in their production. Coutts,[1] following the lead of Silbermann, distinguishes two classes of this disorder. In one, which he thinks should be regarded as merely nightmare, the disturbance is due to a reflex stimulation of the cerebral centres from some peripheral irritation, generally irritation in the alimentary tract; in the other, to which he restricts the name of night-terrors, excitement, in his opinion, is due to disordered central impulses, and should be regarded as an evidence of a neurosis closely allied to epilepsy, if not actually of the same character.

Dr. E. Graham Little,[2] in a paper read before the British Medical Association, August, 1899, has investigated the cases, thirty in all, coming under his notice in the East London Hospital for Children. He states that he has been struck with the large number of instances in which some affection of the heart existed. The ultimate common factor in almost all his cases appeared to him to have been dyspnœa, not of so urgent a type as to be distressing, or even always conscious, but moderate in degree and prolonged. The severe dyspnœa produced by respiratory disease is too violent a stimulus to give rise to this affection. In nearly two-thirds of his cases the night-terrors were associated with some affection of the heart. Out of 30 cases, in 17 there were definite valvular murmurs; in 2 there was increased frequency and some irregularity of the cardiac action, without a murmur, although in both cases there was a rheumatic history. In 5 cases the efficient cause appeared to be enlarged tonsils and adenoids, and in 2 more a chronic rhinitis. In 2 cases there was an obstinate form of indigestion, and in one case only was there a slight connection with epilepsy. From this series of cases he concludes that digestive disturbances do not play the important part in the causation of this affection which is often assigned to them, and that the evidence of connection between epilepsy or allied neuroses and night-terrors is but slight.

---

[1] American Journal of the Medical Sciences, February, 1896.

[2] Pediatrics, October 15, 1899.

CONSTITUTIONAL DISEASES.

Tuberculosis. During the past twelve months several important papers have appeared upon tuberculosis in children. In my review of last year reference was made to the statement of Northrup,[1] that primary infection, in the great majority of cases, takes place in the bronchial glands, and that only in a small percentage of cases is the initial lesion found in the mesenteric glands.

Dr. David Bovaird, at a meeting of the New York Academy of Medicine, March 8, 1899, read an interesting paper in which he presented additional statistics based on the records of a further series of seventy-five autopsies in the New York Foundling Hospital, which confirmed the conclusions arrived at by Northrup. In sixty cases distinct evidences were found that the infection had taken place through the respiratory tract ; in eight of these the lesions in the bronchial and mesenteric lymph-glands were so nearly alike that the question of priority could not be determined ; in seven the records were incomplete, but in no case were tubercular lesions of the intestines or mesenteric glands discovered without accompanying tubercular lesions of the lungs and bronchial lymph nodes.

English pathologists place the percentage of cases where infection has occurred through the intestinal tract at a higher figure. Dr. Leonard Guthrie,[2] after carefully tabulating his notes on seventy-seven autopsies on tubercular children, states that in his experience thoracic tuberculosis is more common than abdominal, in the proportion of three to two ; but the preponderance of thoracic over abdominal tuberculosis is not necessarily entirely due to the direct entry of the bacilli into the air-passages, as infection through the lymphatics of the pharynx, tonsils, and œsophagus, and even through the lymphatics of the intestines and abdominal glands, may show itself in this way.

Still,[3] speaking at the meeting of the British Medical Association, August, 1899, states that out of 1728 consecutive post-mortem examinations in children tubercle was present in 269. The lungs were affected more frequently than the intestine, and, considering that young children swallow all their expectoration, frequent intestinal infection was to be expected. Regarding the condition of the lymph-glands as an indication of the sequence of the infection, he found that out of 216 cases in which a careful examination of their condition had been made, infection had occurred in 138 cases through the bronchial glands and in 63 through the mesenteric glands; in 15 cases infection had apparently occurred through the ears; these, in his opinion, should be grouped with the bronchial cases as being respiratory in origin.

---

[1] New York Medical Journal, February 21, 1891.

[2] Lancet, February 4, 1899.

[3] Pediatrics, September 15, 1899.

In this connection THE INFLUENCE OF THE MILK-SUPPLY ON THE SPREAD OF TUBERCULOSIS has an important bearing. Kanthack and Sladen[1] have investigated the effects produced by the inoculation of guinea-pigs with milk obtained from various commercial sources. Of 90 guinea-pigs thus tested 23 died from tuberculosis. Of these 23, 13 were inoculated with the upper or creamy layer and 10 with the lower or skim-milk layer. Of the sixteen dairies from which the milk was obtained the milk of nine gave rise to tuberculosis; it appears not unreasonable, therefore, to regard these dairies as a source of grave danger, especially to hand-fed infants, young children, delicate persons, and to those suffering from acute disease.

Rabinowitsch[2] has endeavored by careful investigations, carried out in the Pathological Department of the Berlin Veterinary Institute, to determine whether the milk of cattle only slightly infected with tuberculosis and presenting no signs of tuberculosis in the udder contains tubercle bacilli. The milk of fifteen cows reacting to tuberculin, but otherwise evincing no clinical indications of tuberculosis, was examined, and in ten cases, or 66 per cent., there was a positive result. Although the number of these observations is small, the writer thinks that the conclusion is justified that the milk of cows which react to tuberculin should be regarded with the same fear as that from frankly tuberculous cows, and that the surest way to keep a milk-supply free is by the use of the tuberculin test. Kanthack emphasizes the necessity of sterilization.

Professor Adami[3] regards the number of cases which occur during the milk-drinking period of life as a convincing proof of the intestinal origin of many cases of tuberculosis.

SYMPTOMS AND DIAGNOSIS. The early manifestations of tuberculosis in children are extremely indefinite and uncertain. Dr. Bovaird emphasizes the fact that in none of the cases in which the bronchial lymph nodes were the only tissues affected was there a suspicion entertained of their enlargement. An investigation of the records of the New York

---

[1] Lancet, January 14, 1899, No. 3933.

[2] Deutsche medicinische Wochenschrift, May 25, 1899.

[3] Canadian Journal of Medicine and Surgery, December, 1899.

Infant Asylum for the earliest evidences of the presence of tuberculosis reveals only two of distinct value—progressive emaciation not explained by any other disease, and a continued elevation of temperature. It has become a recognized rule in this institution that any child over the age of six months showing progressive loss of weight should be carefully watched and examined for signs of tubercular infection. Persistent fever, not otherwise explained, is also suggestive, especially under the age of two years; but cases of tuberculosis may be met with which run their course without fever or with even subnormal temperatures. It is, therefore, in the lungs that the disease and its advances are to be definitely recognized in the great majority of cases.

In Professor Heubner's[1] clinic the following points in addition to the above are regarded as important in deciding on the probability of the presence of tuberculosis: A phthisical family history, the tendency of a simple affection such as a furuncle or an eczema to run a slow chronic course; progressive emaciation, although associated with a correct diet, and an enlargement of the supraclavicular glands.

Comby[2] states that in infancy three clinical varieties of tubercular infection can be observed. First, apyrexial tuberculosis, which runs the course of an ordinary athrepsia or dyspepsia; in this class the chief symptoms are emaciation, with vomiting and diarrhœa. Second, febrile tuberculosis due to an acute miliary infection in which the symptoms simulate pneumonia, meningitis, or typhoid fever, the temperature has a high range and there is much prostration. Third, pulmonary phthisis, in which the disease runs a course not unlike but more rapid than the affection as met with in adult age. Among the forty-five cases occurring in children between three and fifteen years of age, Comby distinguishes five clinical forms: First, apyretic tuberculosis, showing that latent cases are not infrequent; second, febrile tuberculosis, with a variable temperature, progressive course, and death in a condition of marasmus; third, tuberculosis of a bronchopneumonic form simulating this disease closely; fourth, pleural and peritoneal tuberculosis, sometimes curable; fifth, tuberculosis simulating typhoid fever, with long-continued gastric symptoms; in these the autopsy reveals a very general tubercular infection. The prognosis is less grave in later childhood than in infancy.

TUBERCULOUS ADENITIS. Mr. George Morgan,[3] in a paper read before the British Medical Association, stated that he had examined 3000 children with swelling of the cervical glands; in 78 per cent. he found the teeth in the lower jaw badly diseased, and in 70 per cent. of these the bad teeth, as regards their position and the activity of the carious process, corresponded to the position and degree of the glandular swelling. He called attention to the fact that the sulcus between the gums and the teeth is a place where not infrequently in children we meet with small ulcers, which occasionally become a point of infection. The tonsils, also, and the adenoids in the nasopharynx are often found to be tuberculous, and when such is the case readily infect their associated glands. To attempt to excise enlarged glands not yet suppurating without previously treating and removing all possible sources of re-infection is unwise. In many cases it will be found that constitutional treatment carefully carried out is of much value. Of more importance, however, than the exhibition of any drug is the securing of an abundance of fresh air and sunlight, if possible at the seaside. Every effort should be made to remove promptly all sources of irritation. In the way of local treatment Mr. Morgan strongly recommends the following:

---

[1] Editorial, Pediatrics, June 15, 1899.

[2] Archives de Médecine des Enfants, vol. i., No. 5.

[3] Pediatrics, October 15, 1899.

℞.—Iodi	grs. xij.
Potassii iodidi	grs. xv.
Olei menthæ piperitæ	gtt. ij.
Glycerin	f ℥j.—M.

Sig.—To be applied to the tonsils and pharynx every night.

This will be found of service in many cases if applied before softening takes place. Mr. Morgan strongly objects to the old method of injecting germicidal preparations directly into the gland. Should the glands, however, still increase in size after a fair trial of constitutional and local treatment, or should they show signs of softening, the sooner they are removed the better. In excising the glands no pressure should be made on the affected gland with the fingers or forceps, lest some tuberculous material be pressed from the medulla of the gland into the efferent vessels. Morgan considers this an explanation of the quick relapse which occasionally takes place after excision.

C. N. Dowd[1] quotes from the published statistics of the clinics in Berlin, Strasburg, and Tübingen to show the amount of success that may be anticipated in the operations for the removal of the enlarged glands. In a total of 309 cases a more or less thorough operation was undertaken, and the patients were watched for several years. Of these 202 were apparently cured; 57 were still living, but were suffering from local or general tuberculosis; 50 had died of tuberculosis. These results are much more satisfactory than those noted in one Berlin clinic, where out of 113 children not treated by operation, 21 were apparently cured, 41 were improved, and 51 were recorded as not in any way benefited.

Acute Rheumatic Polyarthritis in Infancy. Dr. D. G. Milton Miller, in a paper read before the American Pediatric Society, June

---

[1] Annals of Surgery, May, 1899.

28, 1899, reviews critically the published cases of this disorder occurring during infancy, and reports a case which he himself had seen. He finds that the affection is very rarely met with under the age of five years. Doubt is thrown on most of the earlier cases reported as acute rheumatism in infants by the recognition, during recent years, of the possible occurrence of scurvy in infants and of pyogenic and gonorrhœal arthritis in the new-born. Infrequent as it is, there are a sufficient number of well-attested cases to prove that the rheumatic state does occasionally exhibit itself in early life as an arthritis. More frequently, however, its manifestations are less definite and may present symptoms which in adult life are regarded rather as complications, such as exudative erythema, tonsillitis, subcutaneous fibrous nodules, endocarditis and pericarditis, and pleurisy. In some instances obscure febrile attacks or nocturnal restlessness, possibly due to muscular pain, may be the only manifestations of the rheumatic state in infants; only in this way are we able to explain those instances of non-congenital left heart disease met with in young children with no history of rheumatism.

Diagnosis. In the diagnosis of such an unusual affection as acute rheumatic arthritis in infancy every other possible cause of a joint affection must be excluded before we can assert that a given case is rheumatic. Marfan[1] insists that in determining the presence of acute rheumatism in infants the following points must be established: Mobility of limb, proneness of the affection to migrate from joint to joint, absence of all tendency to suppuration, liability of the cardiac serous membranes to inflammation, and the favorable therapeutic influence of the salicylates. To these it would be well to add a rheumatic family history and the absence of all other affections apt to be attended by inflammation of the joints. It is to be remembered that there are many instances of joint inflammation in infants that do not suppurate, and yet are not rheumatic; and also that all the infectious diseases, including pneumonia, typhoid fever, and dysentery, may be attended with an affection of the joints closely resembling acute articular rheumatism. Dr. Miller has collected nineteen cases which he regards as fairly genuine instances of this condition; three of them are noteworthy as occurring in the new-born. In these the mothers had suffered from acute articular rheumatism during the last days of pregnancy. In the discussion which followed the reading of the paper Dr. Crandall stated that he regarded acute articular rheumatism as more common in young children than this report would indicate, owing to the very indefinite character of its symptoms.

Infantile Scurvy. At a meeting of the American Pediatric Society, June, 1899, Dr. Crandall reported a case of scurvy in an infant of six weeks. The father and mother had both suffered severely from rheumatism. The child had never taken anything but breast milk, which, although abundant, was very thin and watery. In the discussion Dr. Griffith called attention to the fact that even when scurvy appears in an infant before the eruption of the teeth, a distinctly hemorrhagic condition of the gums may be present.

---

[1] Traité des Maladies de l'Enfance, Paris, 1897, tome i.

Addison's Disease in Childhood. Dezirot[1] has collected the records of forty-eight cases of Addison's disease occurring during childhood. In children this affection is almost invariably due to a tuberculosis. At the onset the symptoms may be vague; weakness, marked anæmia, loss of weight, and gastro-intestinal disorder are the most prominent; convulsions are not infrequent; pigmentation, as a rule, does not occur till late in the disease. The affection runs a more rapid course in children than in adults. In Dezirot's opinion, benefit has been derived from the administration of the extract of suprarenal gland.

During the past year Lartigeau and Happel[2] reported an instance of this affection occurring in a boy of twelve.

Typhoid Fever in Infancy and Childhood. It has been claimed by many writers that typhoid fever is infrequently met with in children under five years of age, but during the past few years an increasing number of such cases have been reported.

SYMPTOMS. In an interesting paper Dr. Crozer Griffith[3] has presented us with a very complete description of this disease as met with in young children. The principal characteristics of the affection at this period of life are an indefinite onset, a tendency to greater mildness and to a shorter course in the attack, and a disposition for nervous symptoms to overbalance the intestinal manifestations. Although in the majority of cases the onset is slow and insidious, yet more frequently than in adults does the disease begin suddenly. The initial symptoms are loss of appetite, headache, and malaise. The temperature of the fever is apt to vary from the typical adult course; during the acme of the disease there may be but little variation between the morning and evening temperature; and the remittent type, so characteristic of the last period of the fever in adults, is frequently absent or greatly curtailed; in a few cases the temperature appears to fall almost by crisis. After the normal has been reached it is easily elevated by entirely insignificant causes. Abortive types are not infrequently met with. The duration of the fever, speaking broadly, averages from fourteen to twenty days. Headache at the onset and afterward slight delirium, especially at night, are not infrequent. In the more severe cases delirium may become pronounced, but the extreme nervous prostration frequently seen in adults is rarely met with in children. In the writer's experience the eruption is as often met with in children as in adults; enlargement of the spleen is always present, though it is not always to be detected; the condition of the bowels is variable and appears to bear no relation to the severity of the disease. Severe diarrhœa is not of common occurrence; intestinal hemorrhage is rare, and when it does occur is generally slight. With reference to the morbid anatomy of typhoid fever in children the following characteristics are to be noted: the mesenteric glands, although nearly always much swollen, present less tendency to the production of ulcers than in adults; the process appears to be rather a hyperplastic than an ulcerative one, yet some degree of ulceration is not infrequent.

---

[1] Thèse de Paris.

[2] Albany Medical Annals, January, 1899.

[3] Philadelphia Medical Journal, 1898, vol. ii., No. 16.

SEQUELÆ. It is to be noted that otitis is more common in childhood than in adults, that nephritis is probably much less common, that chorea follows not infrequently, and aphasia appears to be more frequent.

The PROGNOSIS of typhoid fever in children is, on the whole, good.

WIDAL'S REACTION. At the Infants' Hospital in Boston, Dr. Morse and Dr. Thayer carried out an investigation to determine the comparative frequency of typhoid infection in infants as ascertained by the reaction to Widal's serum. Fifty infants, under two years of age, who were brought to the out-patient department of this hospital for diarrhœal disease, were subjected to the test. The day of the disease upon which the blood was taken varied from the third to the fifty-sixth, in the majority of cases being between the fifth and twenty-first. In only one case was a positive reaction obtained; this was in a baby of seven months, first seen on the fourth day of illness. On testing the blood of the mother, however, who stated that she had had a slow fever ten years before, a positive reaction was obtained in fifteen minutes. This marked reaction in the mother, in the writer's opinion, suggests the possibility, if not the probability, of the reaction in the child being due to conditions derived from the maternal blood or from the breast milk.

TREATMENT. Medicinal treatment should be purely symptomatic. Judgment has to be used in the employment of the bath; certainly there is no need to use the water at as low a temperature as is required in adults. A temperature of 90° or even 95° F., cooled down to 85° F., is nearly always all that is required, and in some cases frequent sponging answers every purpose. It is to be remembered that many children bear elevated bodily temperature remarkably well, and that the disease runs a shorter course. We can, therefore, in many cases afford to let the fever alone.

PATHOLOGY.

BY LUDVIG HEKTOEN, M.D.

INFECTION, INTOXICATION, IMMUNITY.

THE study of the phenomena of infection, intoxication, and immunity progresses vigorously. The humoral and cellular theories are still urged by their respective supporters, although often considerably modified from the form in which they were originally stated. Many additional details have been brought out illustrating the various phases of the questions of immunity and healing. It is becoming more and more apparent, I think, that perhaps no single theory is sufficient to explain all the phenomena observed in infections and intoxications with different organisms and bacterial and other substances in different animals, because the resulting processes are subject to much variation, both in nature and result. In the succeeding pages I shall present some of the more striking examples of the modes of action of the different so-called protective and curative factors as brought out by recent investigations.

Bacteria in Normal Peribronchial Lymph-glands. Kälbe found that in the large majority of cases the peribronchial glands of hogs contain bacteria such as the pus cocci, the bacillus capsulatus, and micrococcus lanceolatus, demonstrable by cultural methods. In two of twenty-three non-tuberculous human bodies, dying from acute infections or accidents, he found tubercle bacilli in these glands. While it seems reasonable to assume that the peribronchial glands exercise some antibacterial influence upon the germs they frequently retain, it should also be noted that these glands might become the entrance-point of organisms giving rise to cryptogenetic infections.

Germicidal Powers of Serum. F. W. White[1] tested the germicidal powers of the human blood-serum by inoculating the serum and then making subcultures at intervals. Active germicidal actions on the typhoid bacillus and colon bacillus were observed; in fatal diseases this power is occasionally lost as far as the colon bacillus is concerned, before death, thus favoring the agonal invasion with this organism. According to White, human serum is not germicidal for the staphylococcus aureus or the streptococcus pyogenes.

---

[1] Journal of Boston Society of Medical Sciences, 1899, iii.

Hamburger[1] found that CO_2 increases the bactericidal action of serum; the blood from the jugular vein is more bactericidal than that from the carotids, and venous blood as well as lymph has greater bactericidal powers under conditions of passive hyperæmia. CO_2 and the alkalinity of thick exudates favor their bactericidal action. On the other hand, his experiments indicate that passive hyperæmia hinders chemiotaxis and diminishes phagocytosis.

Daubler,[2] in a painstaking research, shows that the bactericidal powers of leucocytes from various animal species differ in their action as regards various bacteria. The pus produced by the injection of turpentine was found to be strongly bactericidal, and more so than the pleural exudate caused by injections of gluten. Immunization is not accompanied by the storing up of bactericidal substances, and it is not shown that the bactericidal substances of the leucocytes and of the blood-serum are of the same nature.

Some time ago Pfeiffer showed that an immune serum, in dilutions which had no action outside of the body, would cause solution of cholera spirilla in the abdominal cavity. This was interpreted as being due to fermentative changes in the serum caused by substances in the fluids of the animal injected; but the possible action of leucocytes and other cells could not be excluded in this experiment. Moxter[3] took the serum of goats and guinea-pigs and diluted it to such an extent that the bactericidal action of the alexines was practically suspended; on the addition of a small quantity of serum, rendered wholly inactive by having been heated to 60° C. for one hour, the bactericidal powers promptly reappeared, showing that normal serum contains at least two substances which unite or act upon each other so as to produce alexines. Moxter consequently succeeded in producing the same kind of reaction in the test-tube outside of the body as Pfeiffer produced in the abdominal cavity. The injection into the abdominal cavity of the guinea-pig, of inactive serum, promptly restored its alexines, but the addition of living leucocytes to inactive serum outside of the body did not result in any reproduction of alexines, so that the direct influence of cells cannot be said to be essential for this purpose.

Buchner continues to hold that the normal bactericidal action of the blood is due to enzymes produced by white blood-corpuscles. The blood possesses many functions besides the nutritive. Acting upon this theory, Buchner has treated local inflammations of various kinds, with good results, by producing local artificial hyperæmia. Baumgarten,[4] on the other hand, doubts the existence of bactericidal substances in the blood, because such substances would probably, in case they act chemically, also be protoplasmic poisons and act injuriously on the animal organism. In order to explain natural immunity, Baumgarten revives the old theory of unfavorable soil—that is, in the immune body bacteria fail to find the chemical conditions necessary for their growth.

---

[1] Virchow's Archiv, 1899.

[2] Centralblatt für Bakteriologie, Abth. I., 1899, xxv., 129.

[3] Ibid., xxvi., 344.

[4] Berliner klinische Wochenschrift, October 9, 1899.

Emmerich and Low[1] agree with Pfeiffer, Neneki and others that the soluble chemical substances which cause acquired immunity and the healing of infectious diseases are of the nature of bacteriolytic enzymes; Emmerich and Low claim, however, that they are produced by the bacteria themselves, as Buchner claimed that antitoxin is a bacterial product. Thus, the dying out of bacteria in cultures is often due to the enzymes formed from zymogens in the bacteria. Some of these substances, as for instance the pyocyaneus enzyme, or pyocyanase, may dissolve many other bacteria in addition to the species from which they are derived. The authors showed by actual experiments that pyocyanase destroys large quantities of anthrax bacilli outside of the body, and, furthermore, that it heals infected animals. Pyocyanase also dissolves typhoid, diphtheria and pest bacilli, and neutralizes diphtheria toxin. When united with animal proteids pyocyanase acquires more stability and can be used for immunization ("pyocyanase-immune-proteidin"); rabbits have thus been successfully immunized against anthrax and guinea-pigs against diphtheria. The complete exclusion of oxygen in gaseous form enables the immunizing serum to agglutinate and destroy specific pathogenic bacteria. The alexines of the blood are regarded as bacteriolytic enzymes, which though present are often easily destroyed by the enzymes of bacterial origin. Further investigation is required before the exact scope of bacteriolytic and other enzymes of bacterial origin can be fully established.

The Immunizing and Protective Powers of Internal Organs. Several investigators have taken up the question of the importance of the different internal organs in producing immunizing and bactericidal substances. Manfredi[2] and his students have studied the lymphatic glands in this respect. They find that the lymph-glands may retain for long periods in limited numbers microbes of more or less reduced virulence, the general health not being affected. Neither the phagocytic nor the humoral theory explains exactly this retention; the lymphocytes are not phagocytes, and pure lymph is not bactericidal; the microbes and the cells remain in a condition of symbiosis or mutual tolerance without any inflammatory action such as occurs when many germs are introduced. Evidence is adduced which shows that the microbes gradually lose their virulence, and that in this way a certain degree of immunity may be produced.

---

[1] Zeitschrift für Hygiene und Infektionsk., 1899, xxxi.

[2] Virchow's Archiv, 1899, 155, 335. Zeitschrift für Hygiene und Infektionsk, 1899, xxx., 64.

In another research it is shown that the lymphatic system possesses a greater natural resisting power to anthrax, typhoid, and diphtheria toxin than do other organs; immunity against anthrax can be produced by injections into the anterior chamber (a large lymph space) of the guinea-pig—an animal which cannot be immunized in any other known way.

Wauters,[1] on the other hand, emphasizes the great bactericidal powers of the cells of the red marrow of the rabbit and the pigeon; triturated and extracted with boiled serum, red marrow communicates to the serum a marked bactericidal power, which is demonstrable even when one part of marrow is added to two hundred parts of serum. The extract of the lymph-glands has at the most but transitory and slight powers of this kind, but that of the spleen is more markedly bactericidal. Brain, muscles, and thymus are inactive; the liver, kidneys, pancreas, testicles, and suprarenal glands are but slightly active, while the lungs and the connective tissue are quite active. The bactericidal substances of the marrow and of the blood are affected in a similar manner by heat. The bactericidal powers of the marrow are attributed to the oxyphile cells, which are very numerous in the marrow of the rabbit, and Wauters uses this as an argument in favor of the plurality of the leucocytes.

Blumreich and Jacoby[2] find that splenectomized animals suffer diphtheria and anthrax infection as well as the normal animal, but withstand pyocyaneus and cholera infection even better; the bactericidal powers of the blood are somewhat increased by splenectomy, but no new action is manifested toward toxins. Splenectomy is followed by an increased lymphocytosis (Kurloff). This increased number of lymphocytes and the increased bactericidal powers of the blood after removal of the spleen probably stand in relation to each other. Another explanation is suggested by the fact that the spleen normally retains leucocytic and other cellular detritus, which is currently regarded as furnishing alexines; after removal of the spleen, however, this would accumulate in the blood and increase its microbicidal powers. The swelling of the spleen in certain infectious diseases, especially typhoid fever, is attributed to increase in lymphocytes which produce alexines. In the diseases in which there is marked splenic swelling there is usually hypoleucocytosis, but in those in which the spleen is not swollen—pneumonia—there is generally a polynuclear hyperleucocytosis.

Wassermann[3] demonstrates that in the immunization of rabbits against

[1] Archives de médecine expérimentale et d'anatomie pathologique, 1898, x., 751.

[2] Zeitschrift für Hygiene und Infektionsk., 1898.

[3] Deutsche medicinische Wochenschrift, March 2, 1899.

the pneumococcus, antitoxins appear in such large quantities in the bone-marrow that this is probably the seat of their formation. A considerable amount is also found in the lymphatic structures which are held to act as reservoirs in which the antitoxin is retained. The presence of antitoxin in the bone-marrow, of a patient who died of pneumonia before the crisis, shows that similar conditions obtain in human beings. The relation of antitoxin-production to leucocytosis seems to be a close one, but its exact nature was not established.

Deutsch[1] affirms that the occurrence of typhoid antibodies, especially in the serum and marrow, and in the spleen after intraperitoneal injections of typhoid bacilli in the guinea-pig, indicates that the leucocytes are the source of the antitoxins. Splenectomy during the early days of immunization diminishes the amount of antitoxin, but the removal of the spleen before the immunization is begun has no special effect. Strongly antitoxic serum may have feeble agglutinating power; agglutinins bear the same relations to splenectomy as do antitoxins, so that the spleen, when present, apparently harbors the products which lead to the production of these substances. Deutsch made the observation that the extract of lung tissue of normal guinea-pigs is strongly agglutinating for various bacteria, and he suggests that non-specific agglutinins may be derived from the lungs.

Brunner[2] finds that the endothelium of the cerebral vessels probably has a protective action against certain poisons, because the direct injection into the brain of strychnine produces more marked psychical symptoms than is ordinarily observed, and intracerebral injection of a one-hundredth part of a fatal dose of atropine was lethal to rabbits. Head and Wilson[3] show that the experimental cerebral localization of diphtheria bacilli produces symptoms of hydrophobia, which is in marked contrast to the nervous symptoms of diphtheria intoxication (the result of the usual lodgement of this organism), indicating that possibly the endothelium of the cerebral vessels prevents the toxin from acting directly upon the ganglion cells.

The Protective Role of the Liver Against the Generalization of the Colon Bacillus. In PROGRESSIVE MEDICINE for March, 1899, Vol. I., I made extended reference to Adami's interesting work upon the bactericidal action of the liver upon the colon bacillus. Albert Lemaire[1] had in his possession two races of the colon bacillus, one of which was much attenuated, the other very virulent. He points out that according to Wyssokowitch the liver excretes microbes with the bile, whereas Werigo and others hold that the liver destroys them directly by virtue of the phagocytic action of its endothelial cells, which either englobe the microbes directly or receive them from the leucocytes of the blood.

---

[1] Annales de l'Institut Pasteur, 1899, xiii., 689.

[2] Fortschrift der Medizin, 1899, xvii., 1.

[3] Journal of Experimental Medicine, 1899, iv., 451.

[1] Archives de médecine expérimentale et d'anatomie pathologique, 1899, xi., 356.

Lemaire made the following interesting experiments in order to throw additional light upon the anti-infectious action of the liver and the mechanism of general invasion of the colon bacillus. Intravenous injections in rabbits were made with the two forms of colon bacilli, and the number of microbes present at varying intervals in the general circulation, in the blood of the liver, in the tissues of the liver, in the spleen and bone-marrow, was carefully estimated by means of plate-cultures of fixed quantities of the blood and of the tissues mentioned. It was soon found that the bacilli were rapidly arrested by the endothelial cells of the hepatic capillaries, the feebler organism disappearing from the circulation more rapidly than the more virulent. In fact, the bacillus with exalted virulence did not disappear wholly from the circulating blood, although the number originally present was materially reduced. By tying off a lobe of the liver and then thoroughly washing the blood from the rest of the organ by means of intravascular irrigation with sterile salt solution, Lemaire demonstrated that the microbes are not held back in the liver by the phagocytes of the blood, because the tissue of the part washed out contained just about as many bacilli as the part which still contained blood. This result was fully verified by the study of cover-slip preparations and of sections. In this way the phagocytic action of the endothelial cells was fully demonstrated. The feebly virulent bacillus was completely destroyed, while the strongly virulent organism multiplied within the cells, ultimately destroying the cellular barrier and re-entering the circulation. In other words, it is the function of the endothelial cells of the liver to hinder general infection with the colon bacillus, and a colon bacillus which produces general infection is one which the cells of the liver cannot destroy.

This general conclusion was further strengthened by the results of the study of the phenomena produced by the injection of colon bacilli in rabbits immunized by means of anticolon-bacillus serum. The immunized animals all survived the injection of such quantities of both kinds of colon bacilli as were fatal for the controls. The blood of the immunized animals remained sterile, as did the spleen and the bone-marrow. Careful microscopical examination failed to reveal phagocytosis on the part of the leucocytes; the only place in which bacilli were found was in the liver, and the small number present indicated that ultimately total destruction of all bacilli would have taken place—showing that the anti-infectious serum furthers the action of the endothelial cells of this organ.

Lemaire interprets the result of these experiments as evidence of an hitherto little recognized action of serum—namely, upon fixed cells. We know, he says, that anti-infectious serum neutralizes toxins, agglutinates microbes, and modifies the activity of leucocytes; the serum produced by the colon bacillus has a direct action upon the hepatic endothelial cells whose phagocytosis of the colon bacillus now appears well established.

Lemaire makes no reference to Adami's work in this field, and leaves untouched the possible relation of this bactericidal function of the liver to the development of hepatic cirrhosis. Blachstein's observations upon the prolonged persistence of colon bacilli in necrotic areas in the liver and in the bile also appear to have escaped Lemaire's notice.

I think that Lemaire's interesting results are applicable only to the races of colon bacilli which he employed in his experiments. In my opinion he has not excluded the influence of a possible direct chemical action between the antiserum and the toxins of the colon bacillus.

The Action of Digestive Ferments on Toxins and Antitoxins. Toxins introduced into the digestive tract are harmless, and antitoxins useless when so introduced. Carriere[1] shows that the various digestive ferments, and also intestinal epithelium and intestinal micro-organisms, destroy venin and tetanus toxin, which are not only harmless in the digestive tract, but are devoid also of immunizing powers. Digestive ferments and intestinal organisms also decompose antitoxins.

Vallee found that the bile from rabbits which had died from rabies has no antitoxic powers, but simply the same antiseptic action on the rabies virus as has normal bile; rabies virus mixed with bile does not kill animals when injected, but no immunity is thereby conferred. The liver retains and destroys bacteria, and on this account, as well as for other reasons, the bile may be found to contain various substances of the nature of agglutinins and antitoxins, just as milk has been shown to do, but as yet this matter has not received much attention.

Abbott,[2] reviewing the relation of bile to infection and intoxication, suggests that in experiments this secretion has been treated too much as an inert substance, and thus in all probability it has been robbed of vital properties which it, like blood-serum, is likely to possess in the living body. The bile should be studied in much the same way as living circulating blood has been studied with regard to germicidal and other functions.

Koch found that in the course of rinderpest the bile acquires the power to protect animals against rinderpest. There is good reason to believe that the specific germ of this disease is at the same time present in the bile. It has been thought that the germs are there, but possess little virulence, and cause only a mild infection. Kolle,[1] however, explains the immunity in another way. He urges that the action of the bile consists in so acting upon the tissues about the point of injection that the micro-organisms are prevented from spreading ; the germs, remaining in one place, produce a soluble poison which in turn gives the animal an active immunity, the experiment being in reality a kind of vaccination.

---

[1] Annales de l'Institut Pasteur, 1899, xiii., 435.

[2] Proceedings of Philadelphia Pathological Society, 1899, ii., 183.

Phagocytosis. The phenomena of phagocytosis have heretofore been studied mostly in connection with microbic infection, but of late the reactions of the leucocytes to toxic and chemical substances are receiving increasing attention. Besredka's[2] studies of immunity toward arsenical compounds have brought out many interesting observations, of importance alike to the pathologist and the toxicologist. For experiments with insoluble, or nearly insoluble arsenic compounds, Besredka selected the trisulphide of arsenic (trisulfure d'arsenic), which is very toxic, practically insoluble, and easily recognizable because of its beautiful yellow color. Peritoneal injections are followed by a marked hypocytosis, succeeded, in case of non-fatal dose, by a pronounced hypercytosis especially of mononuclear cells whose protoplasm is filled with yellow granules. If the leucocytes are preoccupied with the disposal of carmine, injected simultaneously or even after the arsenic, then they may fail to engulf arsenical granules, and death may result from an otherwise non-fatal quantity. The arsenicophages are the mononuclear leucocytes and it is not easy to artificially increase their number, but some experiments in which such increase was made showed material increase in the resistance of the animals to the toxic effects. Now the mere taking up of arsenical granules is not the essential function of the cells, but it lies in the subsequent intracellular action whereby a toxic substance is rendered harmless ; the granules remain a long time within the cells, elimination ultimately taking place through the kidneys. From these observations Besredka would draw the conclusion that if leucocytes are able to take up and render harmless as toxic a substance as this form of arsenic, there is certainly no good reason why they might not so act toward bacteria and their products. Thus he would overcome the old objection to the importance of phagocytosis—namely, that the bacteria have already been weakened by the serum. Ingenious as his experiments are and logical as his reasoning is, yet I cannot agree with him that the serum might not have some modifying preliminary influence upon the toxicity of the arsenical granules. Furthermore, comprehensive generalizations from the results of one set of experiments have often proved fallacious.

---

[1] Zeitschrift für Hygiene und Infektionsk., 1899, xxx., 33.

[2] Etude sur l'immunité vis-a-vis des composés arseniaux, Annales de l'Institut Pasteur, 1899, xiii., 49 and 465.

In his second paper Besredka deals with the rôle of the leucocytes in poisoning with soluble arsenic. Fatal doses are followed by a hypoleucocytosis, non-fatal by a preliminary hypocytosis which gives way to a hypercytosis in which there is marked increase in the polymorphonuclears. By producing in recovering animals cold abscesses with dead tubercle bacilli a mass of leucocytes without trace of fluid was obtained, and in these cells appropriate methods revealed the presence of arsenic; no arsenic was obtained in the serum of the centrifugalized, non-coagulated blood, all the arsenic being found in the leucocytic layer. In these experiments positive chemotaxis resulted from a soluble metallic poison which was taken up and retained by the cells.

Besredka succeeded in immunizing animals against the fatal dose of soluble arsenious acid by the fractional injection of the fatal quantity or by injecting a smaller amount twenty-four hours before the lethal dose. The serum of immunized animals possesses antitoxic powers; the antiarsenin acts favorably through the leucocytes, suppression of which paralyzes its action. Besredka and other French investigators strenuously maintain that leucocytes are the main factors in healing, immunity, and antitoxic action.

Cantacuzène,[1] in his study of the phenomena which take place in spirillum septicæmia of geese, failed to obtain evidence that humoral influences play any part in the destruction of the spirilla in the living organism; the bactericidal properties of the serum develop outside of the body in exact proportion to the departure from physiological conditions; in the living animal the spirilla are destroyed in the interior of large phagocytic cells in the spleen, and extracellular destruction is not observed. Gheorghiewski[2] holds that the serum of animals immune to the bacillus pyocyaneus does not possess marked bactericidal properties either outside or within the body, the resistance being due wholly to the phagocytic reaction which the injection of preventive serum in some way favors. In the frog, which, too, may be immunized, the bacilli are also destroyed by the phagocytes.

Almquist[3] took the blood of pigs and centrifugalized it; the layer of leucocytes was then secured in a clear serum. Most of the cells were mononuclear. To this suspension of leucocytes, about 3 c.c., a loopful of bacteria was then added. This mixture was then thoroughly centrifugalized, and it was found that the polynuclear leucocytes were then full of bacteria.

Various bacteria were used, such as the yellow and white pus cocci, diphtheria bacillus, colon bacillus, typhoid bacillus, the spores of anthrax

[1] Annales de l'Institut Pasteur, 1898, xii., 529.

[2] Ibid., 1899, xiii., 298.

[3] Zeitschrift für Hygiene und Infektionsk., 1899, xxxi., 507.

and hay bacilli, etc. The taking up of the bacteria by the leucocytes does not depend upon the cells being alive; the low temperature at which some of the experiments were made would hinder active movement of the cells. The same result was obtained when blood which had been standing twenty-four hours in the ice-box was used. There seemed to be no difference between the action of the cells of blood one hour old and that of blood one day old; the addition of chloroform to the blood did not prevent the occurrence of this phenomena.

The phenomenon of polynuclear leucocytes taking up bacterial protoplasm is likened by Almquist to the attraction between gold and mercury, or of the power of a sponge to soak up water.

Agglutination. Kraus and Low find that normal serum agglutinates many bacteria; thus the serum of the horse agglutinates the colon bacillus, the pyocyaneus, the staphylococcus, etc., but not the cholera spirillum and the pest bacillus. In such cases the action of individual immunity cannot be excluded. These authors state that all kinds of serum, both of man and animals except that of young guinea-pigs, agglutinate the colon bacillus—a fact which suggests the presence of acquired immunity. Specific agglutinating substances appear especially in those diseases whose bacteria produce definite toxic substances in their bodies—the typhoid, cholera, plague, proteus, and pyocyaneus germs; in those cases in which the toxins are secreted by the bacteria, as in diphtheria and tetanus, agglutination is not as yet of any diagnostic value. Mann[1] found that a typhoid serum of strong agglutinating powers in high dilutions agglutinated many different bacteria, and among them a colon bacillus in a dilution of 1 to 1000. This bacillus was isolated from a case of pleuritis complicating typhoid fever. The serum of animals immunized against both cholera and typhoid germs agglutinates both. Arloing and Courmont[2] report fairly satisfactory results with the serum reaction in tuberculosis; on account of the tendency of the tubercle germ to form clumps in cultures great care must be used to well separate the organisms before mixing with the serum.

Pfaundler observes that the close resemblance between the colon bacillus and the typhoid bacillus indicates that the so-called group agglutination may take place, the specific serum exercising its power upon a whole group or family, most markedly, however, upon the species which causes the disease. Escherich[3] holds that every individual has a special or "personal race" of colon bacillus in the intestines, the variation being due to the soil upon which the organism develops. The personal race is not pathogenic as far as its host is concerned, and infection with the colon bacillus occurs only when new virulent forms enter the body from the outside.

---

[1] Archiv für Hygiene, 1899, xxxiv., 179.

[2] Congress in Berlin, May, 1899.

[3] Centralblatt für Allg. Path. und Path. Anat., 1899, x., 413.

Malvoz shows that formalin, oxygenated water, etc., may agglutinate the typhoid bacillus; Blachstein, that chrysoidin affects the cholera vibrio in the same way, and Bossaert[1] finds that while he did not discover any specific, chemical, agglutinating agent, yet chemical agglutination merits further study. Malvoz[2] does not regard agglutination as altogether specific, because it may be caused by chemical substances. In the case of vaccine of the anthrax bacillus distinct agglutination was obtained with the bouillon of filtered cultures, and consequently agglutinating substances may form in the cultures. Lambotte and Marechal[3] show that normal human serum agglutinates anthrax bacilli in dilutions from 1 to 150 to 1 to 350. Gengou[4] emphasizes that as regards anthrax there is no relation between agglutination and immunity. Pitfield[5] shows that foreign serum clumps spermatozoa.

THE MECHANISM OF AGGLUTINATION. There are important objections to the principal theories advanced in regard to the mechanism of agglutination. Thus Gruber's theory of an increased viscosity and swelling of the bacterial membrane hardly tallies with the fact that there is no corresponding change in the form of the bacteria. Dineur's[6] theory that in agglutination the cilia of the bacilli adhere to each other is merely a modification of Gruber's, and fails to account for the agglutination of bacteria without cilia. Paltauf and Nicolle assume that the microbes are mechanically aggregated by the falling down of a precipitate or coagulum, but, as Bordet points out, it is not possible by staining to demonstrate any coagulum. None of these theories explains satisfactorily the agglutination of inorganic substances, such as occurs, for instance, on adding salt to a fluid containing particles of clay in suspension, or alcohol to a suspension of india-ink, or cinnabar in bouillon (Kraus and Seng).[7] Bordet, therefore, places the phenomenon of agglutination in the territory of molecular physics, the serum acting on the microbes changes the molecular attraction between the microbes and the fluid, and causes the bacteria to adhere to each other just as the addition of salt agglutinates particles of clay in distilled water.[8]

The Mode of Action of Antitoxins. The observations just referred to in regard to the action of antitoxins upon ferments naturally support the view that antitoxins unite with the toxins and form harmless chemical compounds as opposed to the theory that antitoxins are essentially cellular or phagocytic stimulants. The reactions obtained outside of the body indicate a direct chemical action between toxins and antitoxins, ferments and antiferments, of various kinds. The processes follow general chemical laws—the union is hastened by heat, retarded by cold, and is an event which requires some time. Toxins resemble enzymes by their great activity in small quantities and by their instability in the presence of chemical and physical agents; but our knowledge of their exact nature is as yet imperfect, and the ignorance of the mode of action of enzymes is as great as that of toxins, only older.

---

[1] Annales de l'Institut Pasteur, 1898, xii.

[2] Ibid., 1899, xiii., 630.

[3] Ibid., p. 637.

[4] Ibid., p. 642.

[5] Lancet, September 9, 1899,

[6] Bulletin de l'Académie Royale de Médecine de Belgique, 1898, xii.

[7] Wiener klinische Wochenschrift, 1899, p. 1.

[8] Annales de l'Institut Pasteur, 1899, xiii.

The view that antitoxins act indirectly by stimulating or immunizing the living cells seems to be losing ground. Cobbett[1] carefully reviews the observations and theories anent the nature of the action of antitoxins, and brings forward a number of experiments in favor of a direct action of antitoxins upon the corresponding toxins. The facts adduced by Cobbett which support this view are: 1. Certain reactions have been observed to take place between toxins, such as venom, ricin, crotin, tetanus toxin, eel's serum, and their corresponding antitoxins when mixed outside of the body. 2. The success of certain attempts to separate the active bodies from neutral mixtures has been due, in some instances, to the fact that insufficient time for their complete union was not allowed, separation being no longer possible if this were granted. 3. The accuracy of titration of toxins and antitoxins to within 1 per cent. of error. 4. The fact that to save an animal from 1000 fatal doses of diphtheria toxin requires a little more than a hundred times as much antitoxin as required for ten fatal doses. 5. The fact that the potency of antitoxin is greatly increased if it is allowed to come in contact with the toxin outside of the animal body, and is, under certain circumstances, increased still further if allowed to remain for some time in contact with the toxin at a suitable temperature.

The combination which antitoxins enter into with their respective toxins is not exactly comparable to those of an acid with an alkali, because it is a much slower one, but it is one which, as suggested by Ehrlich, resembles the formation of a double salt.

Behring,[2] in discussing the quantitative relations of the combination between tetanus toxin and tetanus antitoxin in the body of the living guinea-pig, concludes that the chemical union of the two substances and the neutralization of the toxin occurs wherever in the body the two substances come together. In the interval before chemical union of the poison and the antitoxin occurs, some of the poison in the blood may pass out of the vessels and thus escape union with antitoxin in the blood. In order to reach the extravascular toxin the antitoxin must also pass through the vessel walls. This does occur, and in greater degree the more concentrated the antitoxin in the blood. Antitoxin immunity is high and healing prompt in proportion to the amount of antitoxin held by each c.cm. of blood.

---

[1] Journal of Pathology and Bacteriology, 1899, vi., 191.

[2] Fortschritte der Medecin, 1899, xvii., 521.

J. Danysz[1] claims to have shown that the particular course of the action of toxins and of their mixtures with antitoxins, upon which Ehrlich lays so much stress in the elaboration of his lateral chain theory, does not depend upon the action of different substances of more or less varying toxic power, but upon the varying amount of phosphorus present in the mixtures and in the tissues. The proportion of phosphates markedly influences the effects of toxins and of mixtures of toxins and antitoxins. Herein lies also, it is claimed, the differences observed in the action of a toxin upon animals of different species.

Duration of Immunity; Regeneration of Antitoxins. F. Ransom[2] discusses the conditions which influence the duration of passive immunity in the light of experiments made in Behring's laboratory. The experiments show that a kindred serum is longest retained, but that alien serums are not all gotten rid of with the same rapidity. Behring would speak of active and passive immunization, but not of active (treatment with toxin) and passive immunity (treatment with antitoxin), since in whichever of the two ways it is produced the resulting hematogenic immunity is the essential fact. Horses made immune with horse serum retain their immunity scarcely less long than is the case with animals made isopathically immune.

Solomonsen and Madsen[3] take up the question of regeneration of antitoxin. Two months after the last injection of diphtheria toxin a goat was bled repeatedly, and immediately after each bleeding a quantity of salt solution equal to the amount of blood removed was injected. This resulted in a marked fall of antitoxic powers, followed, however, by a reproduction of antitoxin, showing, according to these authors, that certain cells had acquired a new and persistent secretory property.

PATHOGENIC MICRO-ORGANISMS.

A Pathogenic Sporothrix. A new pathogenic fungus is described by Schenck.[4] It was isolated from a case of refractory subcutaneous abscesses, the primary point of the infection being on the index finger, whence the process extended up the radial side of the arm, along the lymph channels, and gave rise to numerous circumscribed indurations which eventually softened and formed ulcers. The gelatinous contents of the abscesses contained the organism in pure culture. The fungus, which probably belongs to the sporotricha, grows on ordinary media, is aërobic, does not cause fermentation, liquefies gelatin slightly, and is killed on exposure to 60° C. for five minutes. It produces local inflammatory lesions in the dog and mouse; in the case of the mouse general infection may also occur. Morphologically it presents a double-contoured, irregularly branching mycelium, and elliptical or ovate, double-contoured and granular spores or conidia, 3 to 5 microns long, which stain by Gram's method. In hanging-drop cultures six or more conidia are seen to cluster about the tips of spore-bearing branches. In the experimental lesions the organism occurs as short, oval, or oblong bodies, which generally have a clear spot near the centre. Schenck did not find the fungus in the tissues from the patient's arm.

---

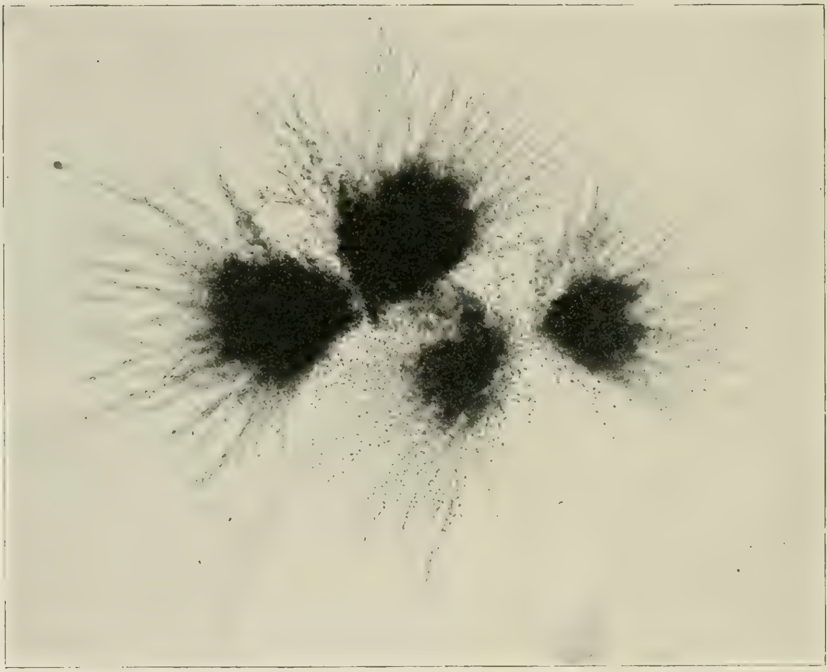
[1] Annales de l'Institut Pasteur, 1899, xiii., 581.

[2] Journal of Pathology and Bacteriology, 1899, vi.

[3] Annales de l'Institut Pasteur, 1898, xii., 763.

[4] Bulletin of Johns Hopkins Hospital, 1898, x.

FIG. 18.[1]



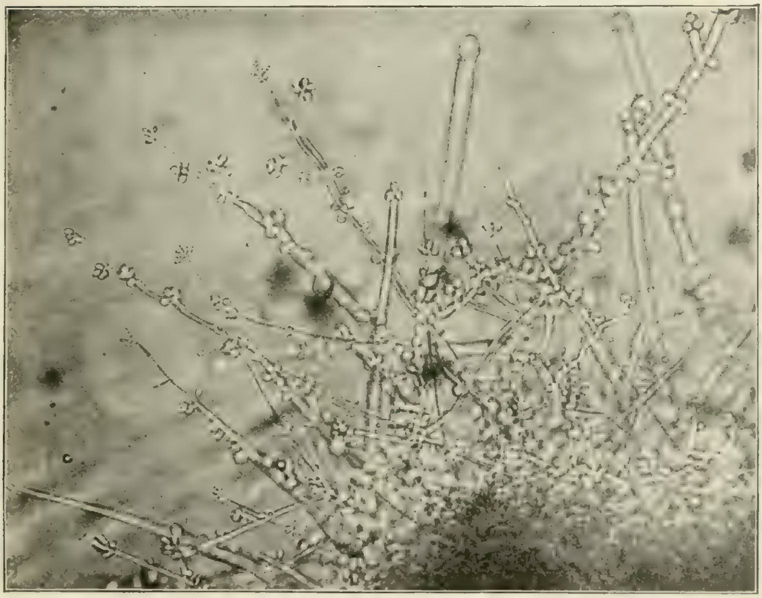
Colonies on glycerin-agar plate, showing conidiophorous threads. × 75.

I have isolated an organism, which is identical with Schenck's in all important details, from the contents of the subcutaneous abscesses of the arm in a case under the care of Dr. C. F. Perkins, of Shenandoah, Iowa. The clinical cause of Dr. Perkins' patient is identical with that of Schenck's. I could not find the organism in a bit of tissue from the wall of an open abscess, but the fungus grew in pure culture in four tubes inoculated upon two different occasions. The morphology and development of the fungus is illustrated in the accompanying Figs. 18 to 21. In addition to Schenck's experiments, I may mention that when inoculated into the abdominal cavity of a white rat it formed a large number of tuberculiform nodules; these were composed of recent fibrous tissue with but occasional giant-cells of the Langhans type, enclosing minute abscesses, among the nuclear detritus of which were characteristic oval and oblong bodies in very large numbers. The lesions produced in mice are rather typical: Inoculated under the skin at the root of the tail there develops a shrunken and more or less ulcerated area, the margins of which are undermined and contain a whitish, gelatinous material, in which the bodies mentioned are quite numerous. The hind legs may be drawn up, the process may spread out into the tail, and after a period of three to seven weeks the animals, greatly emaciated, succumb. The internal organs were all healthy in the animals. In Schenck's experiments the organism was recovered from the abdominal and medi-

---

[1] Figs. 18, 19, and 20 are photomicrographs of the living, unstained fungus.

FIG. 19.

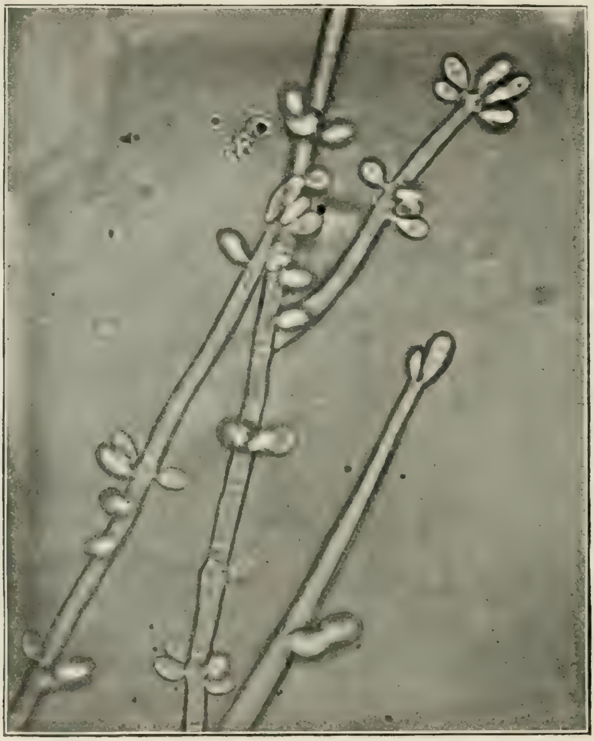


Margin of a hanging-drop culture in bouillon. × 150.

astinal lymph-nodes. In connection with this pathogenic fungus it is interesting to note that in susceptible animals it appears to exist in a modified spore form and to multiply as such.

Pathogenic Blastomycetes. It is yet too early to make many general statements in regard to the relations of blastomycetes to pathological processes. We must be content with simply recording the chief facts of the various contributions furnished to the study of these organisms, which as yet derive their principal interest from their supposed etiological rôle in tumors. Enough observations have already been made to show that hereafter we cannot regard the blastomycetes as *à priori* harmless parasites. I would emphasize the necessity of studying each unknown form which is met with according to the same methods as are used in the study of unknown bacteria, and of determining their morphological and biological properties, in order that the different varieties encountered may be definitely separated from each other.

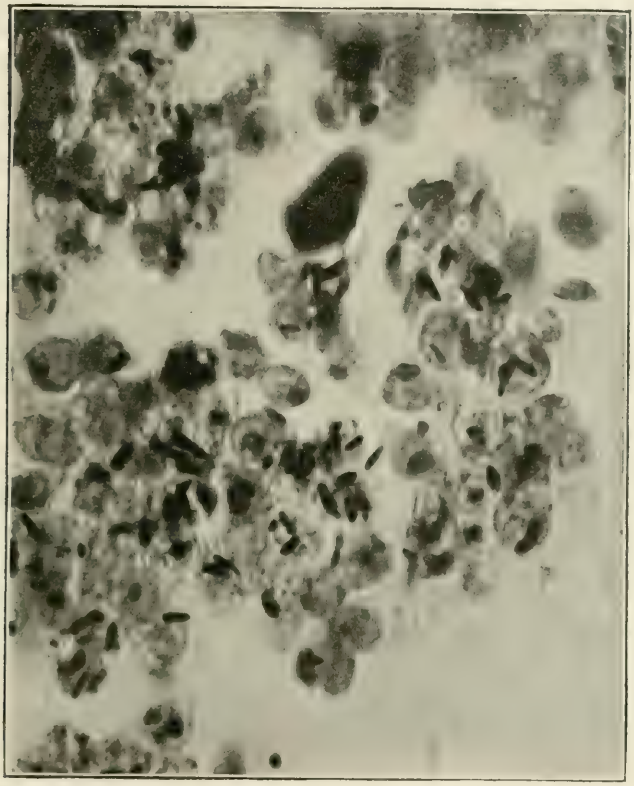
Fig. 20.



Part of field in Fig. 19 more highly magnified. × 1200.

Blastomycetes and Carcinoma. Plimmer[1] made extensive studies of the cell inclusions in carcinoma and their relation to the origin and cause of the disease. In nine cancers out of 1278 examined, representing various organs and parts of the body, the cell inclusions were very numerous, and in two of the nine the "parasites" were present in enormous numbers, thirty-six being counted in one cell. From one of these, a rapidly growing carcinoma of the breast in a woman thirty-five years old, a yeast organism was isolated; this organism varied in size up to 0.04 mm., was provided with a thin, strongly refractile capsule, sometimes doubly contoured, and reproduced itself by budding. For isolating

Fig. 21.



Section through small nodule in abdominal cavity of white rat, showing cells and numerous free and intracellular, oblong and oval organisms. Fixed in Zenker's fluid, embedded in paraffine, stained with lithium-carmine and gentian-violet, according to the Gram-Weigert method.

---

[1] Lancet, March 25, 1899; also Practitioner, April, 1899, and Centralblatt für Bakteriologie, Abth. I., 1899, xxv., 805.

the organism Plimmer employed a cancer infusion, made in the same manner as is ordinary beef infusion, and adding to it 2 per cent. of glucose and 1 per cent. of tartaric acid. Grown anaërobically on this medium the organism at first produces a cloudiness, which disappears as the growth sinks to the bottom, when the infusion becomes clear. On cancer-infusion-agar small white colonies form, which after some weeks change to yellow. The growth is luxuriant on gelatin, which is not liquefied. On potatoes a thick white layer forms, which soon changes to yellow-brown. Grown aërobically the virulence is gradually lost.

Intravenous, subcutaneous, and abdominal inoculations in rabbits gave negative results. Five c.c. injected under the dura of two rabbits resulted in death in from eight to nine and a half days later, the organism being recovered from the brain and other internal organs. Intraperitoneal inoculations of 10 c.c. in guinea-pigs were followed by death after about twenty days, when the peritoneum and omentum were found to be studded with new growths of a white color, and the abdominal lymph-glands were enlarged. The organism was obtained in pure growths from the new formations, the liver, the lungs, and the blood. The nodules are described as of endothelial nature, the organism being present both within and between the cells. Inoculated into scratches on the cornea of a rabbit, proliferation of epithelial cells, in the interior of which the organisms were found, was produced.

Plimmer concludes that many of the intracellular bodies described in the carcinomas correspond to the organism isolated, and he refers to the new growths produced in the guinea-pigs as tumors of endothelial origin.

While not willing to deny the blastomycetic nature of some of the intracellular bodies in carcinoma, or the presence of blastomycetes in the carcinoma studied by Plimmer, I hold that he has not fully proved that the inclusions he describes are yeast organisms rather than hyaline bodies due to degenerative changes. We do not know enough concerning the appearance and staining reaction of blastomycetes in the tissues to be able to say definitely that such intracellular bodies as those described by Plimmer are in reality yeast organisms. As far as my experience goes the only really typical appearances assumed by yeast in the tissues, as far as known, is the doubly contoured vacuolated form, with or without budding. Furthermore, I cannot understand by what right Plimmer refers to the peritoneal nodules in the guinea-pig as "endothelial tumors," because it has not by any means been demonstrated that the new productions correspond to genuine tumors, and are not merely composed of an embryonal granulation tissue of endothelial cells. The study of the pathogenic relations of organisms belonging to this class of blastomycetes should be approached without any preconceived notion as to their etiological rôle in carcinoma and other tumors.

Russell, who first interpreted the hyaline bodies or Russell's fuchsin bodies as blastomycetes, now regards the chain of evidence in favor of this claim as fully completed.[1] Casagrandi[2] isolated blastomycetes from four sarcomata and two carcinomata, but gives no further details. Sternberg[3] studied a number of carcinomata by means of the technical methods described by Sanfelice and others for the purpose of bringing out blastomycetes in the tissues, with the result that the so-called organisms revealed are in reality hyaline and similar bodies produced by degenerative and other cell changes. Sternberg found that pathogenic blastomycetes stain quite in the same manner in the lesions they induce as in pure cultures, and at the same time he finds that some of the bodies in the experimental lesions produced by blastomycetes greatly resemble the bodies found in carcinomata and other tumors. As I stated in PROGRESSIVE MEDICINE[4] last year, the bodies in experimental lesions caused by blastomycetes are not necessarily altered organisms, but are hyaline formations produced in these lesions for reasons that are similar to those which cause like bodies in other morbid tissues. So far the new growths induced by the injection of pathogenic blastomycetes into animals have not been shown to have the histological and clinical characteristics of carcinoma and sarcoma, but are granulation tissue formations.

I have good and sufficient reason to believe that the announcement by Brá, in Paris, of the discovery of a fungus in cancers, which has been extensively noticed in the medical press, is nothing but an annoying bit of charlatanry, wholly unworthy of the publicity it has received.

Blastomycetic Dermatitis. I have described[5] the blastomyces isolated from a typical case of blastomycetic dermatitis, the clinical features of which are considered by Hyde and others.[6] It is a non-fermenting, aërobic, morphologically typical organism, which grows best on beer-wort, glucose-agar, and glycerin-agar; from the surface and stab-growths on these media appear peculiar feathery down-growths and out-growths into the medium; on plain agar-agar light brownish-yellow pigment granules appear in and about the bodies; the organism multiplies by budding. The typical bodies average from 7 to 12 microns in diameter; in liquid media much smaller organisms are produced which resemble small cocci. In some media, especially in Pasteur's fluid, a distinct mycelium, provided

---

[1] Lancet, 1899, i., 1138.

[2] Centralblatt für Bakteriologie, Abth. I., 1898, xxiv., 759.

[3] Ziegler's Beiträge, 1899, xxv., 554.

[4] March, 1899, Vol. I.

[5] Journal of Experimental Medicine, 1899, iv., 261, and Transactions of Association of American Physicians, 1899, xiv.

[6] British Journal of Dermatology, 1899.

with sessile and pedunculated buds, also develops ; at times the mycelium is segmented and presents false ramifications. Hence the propriety of calling this organism a blastomyces may well be questioned.

My organism differs somewhat, especially in certain cultural respects, from the blastomyces dermatididis of Gilchrist and Stokes, but both appear to have produced identical changes in the human skin. There is considerable similarity between the two in their pathogenic action on animals, the one I describe being probably more necrotic and leucotactic in its action, and it is associated with the growth of new tissue and also seems to have a toxic or marantic effect. It therefore corresponds to those varieties of blastomyces which, according to Casagrandi,[1] produce local necrosis or suppurating foci or permanent nodules and marasmus. It appears probable that blastomycetic dermatitis, which is a distinct entity from clinical and histological stand-points, may be caused by closely related forms of blastomycetes. Casagrandi, however, emphasizes the great variability of the individual forms, both morphologically and biologically.

Owens, Eisendrath, and Ready[2] report an additional case of ulcerative blastomycetic dermatitis ; this time the infection involved the skin of the left thigh and produced a large ulcer ; the patient was a woman, aged thirty-eight years. The histological appearances were quite typical, although there were rather few miliary abscesses ; the organisms occurred mostly in the proliferating and infiltrated connective tissue, but were also found in giant-cells. The cultural and morphological characteristics of the organism corresponded quite closely with those of the blastomyces I have described, but inasmuch as only incomplete animal experiments were made, the organism cannot be as closely identified as desirable.

It is interesting to note that the extensive new-formed epithelial masses in blastomycetic dermatitis often present a picture which greatly resembles squamous carcinoma ; on the other hand, the granulation tissue with giant-cells of the tuberculous type may lead to a microscopical diagnosis of tuberculosis. The clinical diagnosis also generally wavers between tuberculosis and carcinoma. Histologically the particularly characteristic feature of blastomycetic dermatitis is the presence in and between the epithelial down-growths of miliary abscesses in which is found the double-contoured, vacuolated and frequently budding organism peculiar to the process. This form of cutaneous infection is evidently not extremely rare, inasmuch as no less than six cases have been recognized in Chicago during the past two years (Wells, Hektoen (2), Owens and others, Coates, and Herzog). The two last named have not yet published their cases, but I am grateful to have had the opportunity to examine specimens of both.

---

[1] Loc. cit.

[2] Annals of Surgery, 1899, xxx., 545.

The Classification and Nomenclature of the Ray Fungi and their Relation to Certain Bacteria, Especially the Germ of Tuberculosis. We may regard the ray fungi as a distinct group closely related to the simplest moulds and to the bacteria. With the latter they are intimately connected by the bacillary forms and characters of certain atypical polymorphous ray fungi, and also by the branching and the club formation of certain rod-shaped organisms now classed as bacteria. The atypical ray fungi include in the first place certain acid-proof organisms which resemble the bacillus of tuberculosis not only by their staining peculiarities, but also in their special mode of pathogenic action, producing lesions which resemble those of tuberculosis. The processes have frequently been called "pseudotuberculosis." Here belong the organisms described by Sabrazes and Riviere,[1] Eppinger,[2] Berestneff,[3] Dessy,[4] and others. The only instance of this sort so far described in this country is the case of Flexner,[5] who, however, did not succeed in cultivating the organism. Infections of this sort are therefore preferably designated as forms of actinomycosis rather than streptotricosis or pseudotuberculosis.

Another group of atypical ray fungi may be referred to as polymorphous. The polymorphous ray fungi have lost such characteristics of actinomycetes as spore formations, at the same time that they have taken on certain morphological and cultural peculiarities of bacteria, including the property of existing on certain media in the rod form and of multiplying as such. At the same time the lesions which they produce are in nowise distinguishable from those produced in natural infections with the typical ray fungi. As examples of atypical polymorphous ray fungi may be mentioned the actinomyces of Wolf and Israel, which by many is erroneously regarded as the typical organism of actinomycosis, the pleomorphic fungi described by Berestneff and others. Levy,[6] Hayo Bruns,[7] and Foulerton[8] also describe several ray fungi which belong in this subdivision.

It will be observed that I have changed my views materially in regard to these questions concerning actinomycosis as compared with the statements made a year ago.[9] I believe now that all morbid processes caused by the various forms of ray fungi should be designated as actinomycosis. There is actinomycosis caused by typical and by polymorphous ray fungi, in both of which cases the anatomical and clinical features are similar, and the fungi in the lesions form the well-known kernels with clubbed peripheral expansions—actinomycosis with granules—and there is actinomycosis without granules caused by atypical, acid-proof ray fungi. Pseudoactinomycosis, if the term be used at all, should be restricted to little known bacterial processes, apparently of rare occurrence, in which granules similar to, but not identical with, those of actinomycosis are found in the lesions. Eventually this term should be dropped.

---

[1] Semaine Médicale, 1895, xv., 383.

[2] Ziegler's Beiträge, 1891, x.

[3] Loc. cit.

[4] La Settimana Medica dello Sperimentale, 1896.

[5] Journal of Experimental Medicine, 1898, iii. 435.

[6] Centralblatt für Bakteriologie, Abth. I., 1899, xxvi., 1.

[7] Ibid., p. 11.

[8] Lancet, September 16, 1899.

[9] PROGRESSIVE MEDICINE, March, 1899, Vol. I., p. 230 et seq.

The atypical transitional forms of ray fungi are met, as it were, by organisms now grouped as bacteria, but some of these at times branch and, under certain special conditions in the tissues, group themselves in masses with bulbous projections. I refer to the bacillus of tuberculosis and allied organisms, to the diphtheria bacillus, the glanders bacillus, and a few other less well-known germs.

When the tubercle bacillus is passed through cold-blooded animals, such as frogs, it becomes so modified that it adapts itself better to a purely saprophytic existence; the growth on artificial media is more vigorous, takes place at ordinary temperature, and its virulence is materially reduced. Under these conditions, in which it is regarded by Lubarsch[1] as presenting a partial reversion to its original saprophytic state, the branching is quite frequent and regular. The organisms isolated by Möller from grass and cow's dung greatly resemble the tubercle bacillus in morphological, pathogenic, and many cultural properties. These bacilli, as well as similar bacilli isolated from Berlin butter by Petri and by Lydia Rabinovitch, also produce branching threads to a greater or less extent. In fact, I think that the suggestion lies near at hand that different varieties of the tubercle bacillus may be the parasitic adaptation forms of some of these organisms naturally found upon grass and elsewhere, which are closely related to the ray fungi; and it seems to me, furthermore, that there is a possibility that parasitic adaptation of such germs may play some part in causing tuberculosis at the present time. In this way new and perhaps virulent races of tubercle germs may be started upon careers of pathogenic parasitism. Pettersson,[2] however, regards this as unlikely, because, though searched for, the saprophytic existence of the tubercle bacillus, except in culture media, has not been shown.

But to return to the relationship of the tubercle bacillus to the ray fungi. Schulze[3] has confirmed and enlarged the observations of Babes and Levaditi and of Friedrich upon the occurrence of an actinomycelial arrangement of the tubercle bacillus in the tissues. He finds that tubercle bacilli from various sources and of varying virulence may arrange themselves in radiating foci and form metachromatic and acidophilous clubs and other shapes, both when injected through the arteries and when implanted into various organs of the rabbit. Schulze also shows that under similar conditions the avian bacillus as well as the actinomyces of Eppinger—an acid proof, atypical ray fungus—may arrange themselves in masses with clubbed, radiating prolongations. By recultivating the injected germs Schulze successfully meets Boström's[1] criticism of the experiments of this kind to the effect that the radiating appearances were due to moulds injected at the same time as were the bacilli.

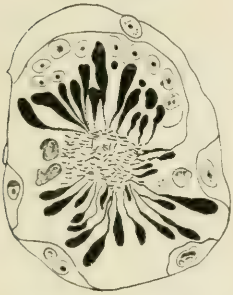
---

[1] Zeitschrift für Hygiene und Infektionsk., 1899, xxxi., 187.

[2] Berliner klinische Wochenschrift, 1899, xxxvi., 562.

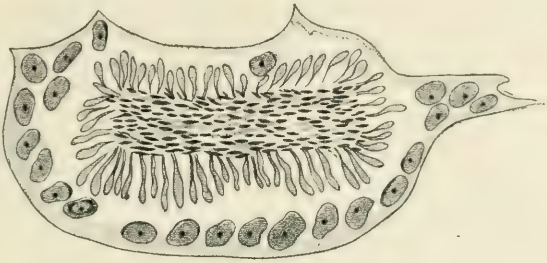
[3] Zeitschrift für Hygiene und Infektionsk., 1899, xxxi., 153.

FIG. 22.



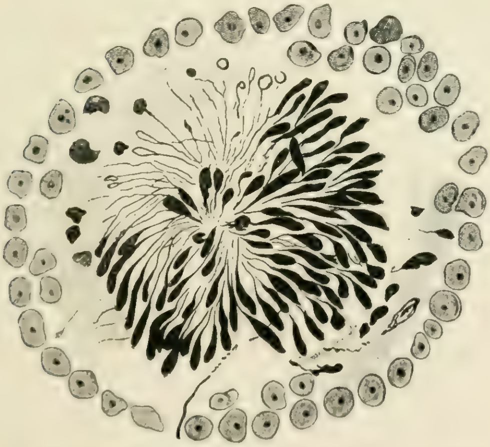
Radiating, clubbed prolongations from a mass of tubercle bacilli in a cerebral lymph-space of the rabbit. Zeiss 1-12, ocular 3. (SCHULZE.)

FIG. 23.



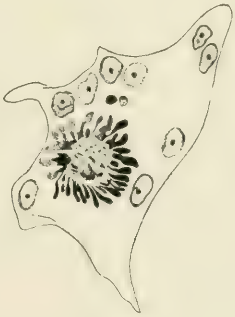
Large, radiating mass of tubercle bacilli, with numerous clubs, in a huge giant-cell in a cerebral nodule in a rabbit. Zeiss 1-12, ocular 3. (SCHULZE.)

FIG. 24.



Actinomycelial cluster in giant-cell; inoculation of rabbit with the acid-proof, atypical ray fungus of Eppinger. Zeiss 1-12, ocular 3. (SCHULZE.)

FIG. 25.



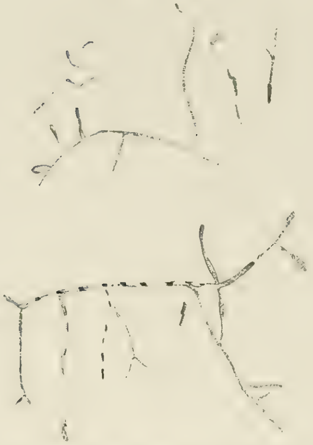
Giant-cell with actinomycelioid cluster. From a renal tubercle 14 days after injection with Moeller's timothy bacillus. Zeiss 1-12, ocular 2. (LUBARSCH.)

---

[1] Verh. d. deutsche Path. Gesellschaft, Erste Tagung, 1899.

Lubarsch,[1] in whose laboratory Schulze worked, shows that the acid-proof and alcohol-proof bacilli isolated by Möller[2] from grass and dung, and by Rabinovitch[3] from butter, also form clubbed ray foci when implanted into the tissues. The best results were obtained with Möller's timothy bacillus I. The nodules which developed around the clubbed granules resembled typical tubercles to perfection. Lubarsch did not succeed in obtaining actinomyceloid granules in similar experiments with the bacillus of glanders, the bacillus of diphtheria, nor with the ray fungus isolated but not yet fully described by Petruschky. (Figs. 22 to 26.)

FIG. 26.



Branching of Moeller's timothy bacillus in agar culture, 5 days old. Zeiss 1-12, ocular 4. (LUBARSCH.)

Recently, Friedrich and Nösske[4] have published an extended investigation upon the localization of tubercle bacilli when inserted directly in the arterial circulation of the rabbit, and upon the actinomyceloid growth form of the bacillary foci in the organs. Their results correspond in the main with those of Schulze and Lubarsch. It was found that for unknown reasons the spleen rarely became infected after direct arterial injection. A tuberculous iritis was observed constantly, and was found to be a sure indication that characteristic foci with radiating peripheral clubs had formed in many of the internal organs, especially in the kidney, in which they were always present and well developed on the twenty-third to the twenty-eighth day. The cultures used consisted exclusively of slender rods, and threads were not observed in the bacillary foci in the tissues. The clubs presented the same staining peculiarities as the clubs of actinomycelial kernels.

The formation of clubs by tubercle bacilli and allied organisms, when placed in the tissues under certain conditions, is regarded by Lubarsch as dependent upon a hyaline swelling of the membrane of the organism, because in not a few cases rods and threads could be followed into the bulbous expansion as axial filaments. Both Lubarsch and Schulze, as well as Friedrich and Nösske, regard the clubs in the light of malformation due to hinderances to growth — *hemmung missbildung* — rather than as purely degenerative, because the clubs develop only when the organisms injected multiply *in loco* and not when direct disintegration takes place. Friedrich and Nösske point out that club formation is not observed in the case of single tubercle bacilli lying in the tissues, but occurs when healthy organs are suddenly overrun with fully virulent bacilli—conditions which are not at all likely to occur in spontaneous infections. Consequently it is not probable that tubercle bacilli will present clubbed thickenings in the human body.

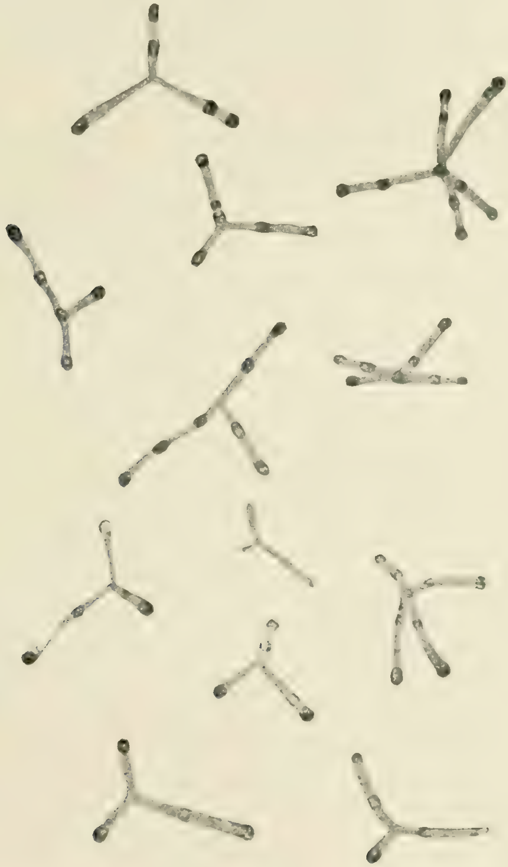
---

[1] Loc. cit. [2] Centralblatt für Bakteriologie, Abth. I., 1899, xxv., 369.

[3] Zeitschrift für Hygiene und Infektionsk., 1897, xxvi.

[4] Ziegler's Beiträge, 1899, xxvi., 470.

FIG. 27.



Branching forms of diphtheria bacillus. Löffler's methylene-blue stain. The dark masses are red or purple, the rest blue. (HILL.)

Hill[1] describes and illustrates the branching of diphtheria bacilli, the form most frequently assumed being that of a tri-radiate star, a granule being frequently situated at the point of origin of the branches (Fig. 27).

---

[1] Journal of Boston Society of the Medical Sciences, 1899, iii., 86.

Galli-Valerio[1] describes the development of branched forms of the bacillus of glanders when cultivated in peptonized bouillon. The ends were often the seat of club-shaped and irregular swellings. Marz[2] also found longer and shorter branches, especially in older cultures.

There has not been entire unanimity as to the interpretation and significance of the branching forms of the various bacilli mentioned.

A. Fischer[3] regards them as involutional, of a pathological and degenerative nature, consequently without any phylogenetic significance. Foulerton[4] seems of the same opinion. Most investigators, however, hold that these organisms are not true bacteria, but growth forms of higher fungi. In the light of the studies of Fischel and Coppen-Jones, Hueppe[5] regards the tubercle bacillus as a parasitic growth form of a pleomorphic mould. For morphological reasons, principally, the branching bacilli are generally regarded as closely related to if not identical with the ray fungi (Fischel, Johan-Olsen,[6] Coppen-Jones, Kruse, Lachner, Schulze, Lubarsch, Hill, etc.). Bataillon and Terre[7] consider the germ of tuberculosis, as we know it, as the result of a parasitic adaptation of a higher fungus than bacilli. The organisms of mammalian and avian tuberculosis, of tuberculosis of cold-blooded animals, of pseudotuberculosis, and of actinomycosis are varieties of the same parasitic forms. Ledoux-Lebard's[8] proposal to class the tubercle bacillus as a cladothrix, because of its arrangement in the cultures, cannot be accepted in view of the occurrence of true branching.

Lubarsch proposes to include under the group-name of streptothrix all the ray fungi and also those organisms usually classed as bacteria, which occasionally produce true branches in the cultures and ray forms in the animal organism. He would place this group midway between the hyphomycetes and the schizomycetes because its members represent transition stages between the higher and lower fungi. Thus the streptotrices, with branching mycelium and distinct spores, are so closely related to the hyphomycetes that by many they are made a distinct family of the thread fungi. The tuberculomyces and allied organisms, on the other hand, are probably parasitic adaptation forms of similar fungi, which have largely or wholly lost the power of branching and spore formation, and on this account resemble the fission fungi. Lubarsch would further create a distinct family in the streptothrix group of those organisms which appear in the ray form in the tissues. To this family he would apply the distinctive name of ray fungi. I do not believe that this proposition is well considered. In the first place, as already set forth, there are serious objections to the use of the word streptothrix in this connection. In the second place, the carrying out of this proposal would throw together in a closed circle the most typical of this group, such as the actinomyces albus, with the most atypical or imperfect, such as the tuberculomyces (to use the word suggested by Johan-Olsen and Coppen-Jones), simply upon the strength of a pathological manifestation, namely, that of club formation, which in the case of the tubercle fungus is apparently of extreme rarity because of the special conditions required for its development.

---

[1] Centralblatt für Bakteriologie, Abth. I., 1899, xxvi., 177.

[2] Ibid., xxv.

[3] Vorlesungen über Bakterien, 1897.

[4] Lancet, September 16, 1899.

[5] Principles of Bacteriology, translated by Jordan, 1899.

[6] Centralblatt für Bakteriologie, Abth. II., 1897, iii., 273.

[7] Comptes-rendus de la Société de Biologie, 1899, vi. s., i., 508.

[8] PROGRESSIVE MEDICINE, March, 1899, Vol. I., 223.

The demonstration that tuberculomyces may form ray foci is undoubtedly important, because it brings further proof of the relationship of this organism to the ray fungi ; but for the present these observations are hardly sufficient to form the basis of the ultimate classification of organisms of whose natural history but very little is as yet known.

As a matter of fact, tuberculomyces and allied organisms resemble much more the acid-proof and atypical ray fungi, which do not form actinomycelial clusters in the lesions of spontaneous actinomycosis, than they do the typical pathogenic ray fungi. Consequently it would appear more natural to place the tuberculomycetes in the sub-group of the atypical, acid-proof ray fungi. As regards the remaining bacilli which occasionally produce branches (bacilli diphtheria, glanders, etc.), the observations at hand simply indicate that they resemble in many respects the polymorphous atypical ray fungi, not having been shown, however, to form clubbed granules in the tissues.

The foregoing considerations demonstrate clearly, as emphasized by Hueppe, that the usual designations—bacilli, bacteria, and bacteriological—are not adequate to represent " correctly and scientifically the exact situation." Of the various terms already proposed as substitutes for the term the bacillus of tuberculosis, the old name, viz., sclerothrix Kochii (Metschnikoff), mycobacterium tuberculosis (Marpmann), the most available and probably most significant at present would seem to be tuberculomyces, the tubercle fungus, the fungus of tuberculosis.

Should the observations ultimately make it clear that the diphtheria bacillus also belongs to the ray fungi, then the substitution of fungus for bacillus would indicate its botanical position more clearly.

New Acid-proof Bacilli and Further Studies in this Group. Alfred Pettersson[1] has studied the morphological and other peculiarities of the " acid-proof " bacilli, there being now seven organisms which more or less resemble the tubercle bacillus in staining and other characteristics. The importance of these organisms in the differentiation of the tubercle bacillus is emphasized, and the botanical relationship of the whole group to ray fungi is recognized. The acid-proof organisms of Möller and others are saprophytes and facultative parasites. The ray fungi proper include both parasitic and saprophytic forms, the parasitic being, as already pointed out, in some cases acid-proof. Living tubercle bacilli have as yet been found only in the parasitic stage, though saprophytic growth is easily secured in cultures. The bacillus of lepra exists only as a parasite. It is of importance to note that closely related fungi under conditions of parasitic adaptation present themselves in the form of bacilli.

---

[1] Berliner klinische Wochenschrift, 1899, xxxvi., 562.

Histogenesis of the Actinomycotic Nodule. Cl. L. Hoche[1] presents a study of the histogenesis of the nodule in typical actinomycosis. The essential points brought out are that the ray fungus, especially when of feeble virulence, provokes an active phagocytosis and the establishment of an area of inflammation. The gradual extension of the lesions is caused by the transportation of the mycelial filaments by the phagocytes. The absence of involvement of the regional lymph-glands is due to the accumulation of cells about the periphery of the focus, and generalization occurs only through the invasion of the walls of bloodvessels.

I cannot agree with Hoche that all the cells concerned in the actinomycotic process are leucocytes. There are good reasons for believing that embryonal connective tissue cells are produced in goodly numbers and take a prominent part in the process of phagocytosis and of building up the inflammatory tissue which appears to limit the extension of the organisms. Neither does it seem to be clearly established, as claimed by Hoche and other French writers on this subject, that the hyaline bodies which are found in the actinomycotic lesions all represent degenerative changes in the fungous thread, and are not, in some measure at least, the result of cellular changes.

The Exudative Lesions of Tuberculosis and the Action of Tuberculin on Tubercle and Phagocytosis. Jules Auclair[2] points out that there are three reasons for regarding the exudative pneumonia in certain forms of pulmonary tuberculosis as due to a mixed infection, in accord with the dualistic view commonly held : the frequent absence of hepatization about frank tuberculous lesions ; the presence of other microbes than the tubercle bacillus in the hepatized area, and the absence of the tubercle bacillus in this region. It will be recalled that in answer to the last argument A. Fränkel and Troje advance the theory that the secretory products of the bacillus in the adjacent tubercles produce the pneumonic process.

---

[1] Archives de médecine expérimentale et d'anatomie pathologique, 1899, xi., 599.

[2] Les Poisons du Bacille Tuberculeux Humain, Archives de médecine expérimentale et d'anatomie pathologique, 1899, xi., 363.

Auclair, with this consideration in view, injected into the trachea of guinea-pigs toxins extracted from the tubercle bacillus by means of ether. Sixty-five milligrammes of this ethereal extract mixed with 3 ccm. of sterilized water were slowly injected. Ordinarily the animals died in twenty-four to thirty-six hours. The lungs contained numerous islands of typical fibrinous consolidation. Injected in smaller but repeated doses a typical caseous bronchopneumonia was produced after about two months. Careful bacteriological examinations excluded the presence of micro-organisms in all the instances. Hence it would seem that tuberculous pneumonia in all its stages, from fibrinous and catarrhal exudation to caseation, may be caused by the tubercle bacillus alone, due to the action of a special poison secreted by the bacillus and extracted by ether and other solvents.

Stroebe[1] studied the action of tuberculin TR upon tuberculous guinea-pigs. While he could not demonstrate that this substance actually kills the tubercle bacillus in the tissues, yet a certain amount of evidence is presented to show that a diminution in the virulence of the germ takes place. The histological processes in animals treated with tuberculin TR are marked by greater production of new connective tissue, and there is not formed such extensive necrotic areas as in untreated animals.

Broden[2] took up the study of the histogenesis of experimental peritoneal tubercle with the object of establishing the part of the different cells which enter into its formation and the mode of action of tuberculin. Contrary to Borrell and others, Broden denies the exclusively hematogenous origin of tubercles which he finds are composed largely of endothelial cells. Under the influence of tuberculin Broden found that the tubercles developed with much greater rapidity, and larger nodules were formed with but few bacilli in their interior, and these seemed to be degenerate and not able to multiply. The formation of tubercles is therefore to be regarded as a favorable local reaction, and tuberculin acts by increasing the normal powers of the organism which puts forth a more energetic cellular defence.

Dembinski[3] shows that in the pigeon there is a marked difference in the kind of initial phagocytosis following the injection of the bacillus of avian and that of human tuberculosis. In the case of the avian bacillus the cells which accumulate remain single, and there is but comparatively little effective phagocytosis. In the case of the human bacillus the leucocytes fuse themselves into giant-cells, which seem to render the bacilli inoffensive, being more powerful than isolated leucocytes.

---

[1] Ueber die Wirkung des neuen Tuberkulin TR auf Gewebe und Tuberkelbacillen, Jena, 1898.

[2] Archives de médecine expérimentale et d'anatomie pathologique, 1899, xi., 1.

[3] Annales de l'Institut Pasteur, 1899, xiii., 427.

A New Stain for Bacillus Tuberculosis. M. Dorset[1] recommends the staining of cover-glass preparations, made in the usual way, for five to ten minutes in a cold saturated solution of sudan III in 80 per cent. alcohol, and then to wash for five minutes in 70 per cent. alcohol. Tubercle bacilli stained in this manner are not decolorized after remaining in 4 per cent. solutions of sulphuric, nitric, or hydrochloric acids or ammonia. Sections (fixed in alcohol and embedded in celloidin) may be stained in the same manner, and then counterstained with methylene-blue, dehydrated in absolute alcohol, and cleared in oil of cloves. Smegma and many other bacilli are not stained by this procedure. Presumably the method depends on the presence of fat in the tubercle bacilli, and the beaded appearance, which is very marked in the sudan preparations, probably indicates the presence of fat drops in the bacilli. Sudan III is a specific stain for fat. How far this method is applicable for office use cannot yet be stated.

Pseudotuberculosis. The Pathological Society of London recommends that this term be discarded altogether.[2] "Pseudotuberculosis" includes various etiologically distinct processes, which resemble each other more or less in the production in the tissues of small nodules or tubercles, such as (*a*) a number of bacterial infections caused by bacilli and cocci of various species, (*b*) blastomycosis, (*c*) actinomycosis (streptotrichosis), (*d*) aspergillosis, (*e*) protozoan infections, and (*f*) pathological conditions resulting from the presence of higher animal parasites, mostly worms. There can certainly be no scientific ground for continuing pseudotuberculosis as a designation of this heterogeneous and ill-assorted group.

The committee referred to points out that the existing confusion has arisen from the use of the word tubercle in two senses: (1) As a general term for a small nodule; (2) in a specific sense for the nodular lesions of the disease caused by the tubercle bacillus of Koch. It, therefore, recommends that its use as a general anatomical term be stopped; but if used at all, it should be only as a designation of the lesions produced by the tubercle bacillus. All lesions having the form of tubercles should be called generally nodules, those produced by Koch's bacillus being distinguished as tuberculous nodules; nodules produced by other causes should also be designated by a prefix indicative of their cause if known, or if their cause is not known, by some designation not involving any reference to the word "tubercle." The diseases themselves (as designated from the lesions produced) should, when possible, be given an etiological name, such as blastomycosis, streptotrichosis (preferably actinomycosis), etc. In this way the term "pseudotuberculosis" would become superfluous. I think that this effort to found our nomenclature upon distinctions resting on etiological grounds should be supported in the interests of scientific pathology and correct diagnosis. Such arguments as this—that aspergillosis, blastomycosis, etc., convey no meaning whatever "to the minds of others than expert bacteriologists"—fall to the ground in face of the fact that they are in reality the only terms which can convey to anyone any real indication of the true nature of the processes.

---

[1] Reports and Papers of the American Public Health Association, 1898, xxiv., 157.

[2] Report of the Committee of the Pathological Society of London, Appointed to Consider the Nomenclature of the Conditions Sometimes Described as Pseudotuberculosis. See also "Pseudotuberculosis," correspondence in Journal of American Medical Association, June 17, 1899, p. 1376.

The Capsulated Bacilli. As remarked by L. W. Strong,[1] the classification and identification of the capsule-forming bacilli have for a long time given rise to much discussion and difference of opinion, while the recognition of their importance has steadily increased.

The members of this group are frequently met with in connection with local inflammatory processes, and also as the causes of general infections and hemorrhagic septicæmias. Joseph J. Curry[2] reports twelve cases in which the bacillus capsulatus occurred in the Boston City Hospital during the past three years. It was isolated from the throat in six cases of diphtheria and two of tonsillitis; from two cases of otitis media (in one together with the diphtheria bacillus); from the internal organs of one case of lobar pneumonia due to the micrococcus lanceolatus, and from one case of acute endocarditis. The only previous writer to mention capsulated bacilli as the cause of acute endocarditis is Weichselbaum. The relations of capsulated bacilli to lobar pneumonia are in all probability merely those of double or mixed infection, of importance principally because the capsule bacilli may interfere with the demonstration of the micrococcus lanceolatus. Lobar pneumonia is invariably due to the micrococcus lanceolatus. This appears to be the only reasonable conclusion, in view of the clinical course of the disease. This view is materially strengthened by the results of the bacteriological examinations in the Boston City Hospital, which show that true acute lobar pneumonia is always due to the micrococcus lanceolatus. Curry holds that the reports of the various investigators who attribute lobar pneumonia to the capsulated bacillus cannot be accepted because their examinations were not complete enough. The Boston investigators attribute their finding the micrococcus lanceolatus so regularly in acute lobar pneumonia to the careful observance of the following rules:

---

[1] Journal of Boston Society of the Medical Sciences, 1899, iii., 185.

[2] Journal of Experimental Medicine, 1899, iv., 169.

1. Several cultures on blood-serum are taken from the solidified lung, both from the older and fresher areas, also cultures from the heart's blood, the liver, kidneys, and spleen.

2. Cover-slip preparations are made from various parts of the solidified lung, also from pleural and, if present, the pericardial exudates, at least three or four preparations being made from each place; they are stained for capsules and by the Gram stain.

3. Sections of lung and of the other organs are studied histologically and bacteriologically.

4. When the results of the bacteriological examination at the autopsy are not decisive as to the presence of the micrococcus lanceolatus, inoculations of animals are made.

W. T. Howard, Jr.,[1] reports a case of fatal hemorrhagic septicæmia in man due to a capsule bacillus which belongs to this group, although differing in some respects from some of its members. Among the changes produced by this bacillus may be mentioned fatty degeneration of the endothelial cells with rupture and hemorrhage and marked destruction of the red corpuscles, with the accumulation of pigment in the internal organs. Howard also observed that direct and retrograde embolism of the liver-cells had taken place.[2]

During the past few months the bacillus mucosus capsulatus has been isolated in pure culture from all the organs in no less than four cases studied in my laboratory. These cases include a new-born child with congenital heart disease in which the bacillus mucosus was found in great numbers in all the organs, in some of which there were numerous hemorrhages; in a case of carcinoma of the stomach; in one of general peritonitis following calculous cholecystitis and biliary fistula, and in this case there was present also the bacillus coli communis; the fourth case was one of double serofibrinous pleuritis and pericarditis associated with grave anæmia, and the only organism present was the bacillus mucosus, which occurred in large numbers in all the organs. In a fifth case this bacillus was found as a second infection of the lung in typical lobar pneumonia. The bacilli isolated all correspond fairly well to the classical description of the Friedländer organism; the one from the case of congenital heart disease being in all respects typical of this group as described by Strong (see below).

It seems to be the general conviction that the numerous capsule bacilli, described from time to time under various names (Bacillus pneumonia Friedländer, B. mucosus capsulatus Wright and Mallory, B. capsulatus Pfeiffer, B. ozænæ, B. sputigenus crassus, B. rhinoscleroma, B.

---

[1] Journal of Experimental Medicine, 1899, iv., 149.

[2] For an anomalous bacillus of this group, see also Ohlmacher, Bulletin of the Ohio Hospital for Epileptics, 1898, i., Nos. 2 and 3, p. 22.

mucosus capsulatus septicus, B. lactis aërogenes, etc.), are members of the same group or varieties of the same type, and that the different forms —the numerous new capsule bacilli—depend largely on variability, especially as to the production of gas and acid, as to capsule formation, and pathogenesis (Strong, W. Müller[1]), because the points available for differential diagnosis are found to be slight and in no sense absolute (Strong).

A. de Simoni[2] observes that capsule bacilli, including the bacillus of Frisch, the generally accepted cause of rhinoscleroma, frequently occur upon the mucous membrane of the human nose in mild inflammations and in the practically normal nose of many animals. Comparing the biological and morphological characteristics of these capsule bacilli with Frisch's and Friedländer's bacilli, he reaches the opinion that all are varieties of one species, of which the pneumobacillus of Friedländer is the principal representative. The question arises, therefore, whether these varieties are in a measure interchangeable, and whether a typical capsule bacillus localized in the nose, for instance, can become so altered in its cultural and morphological characteristics that it becomes a distinct variety of the classical type.

Strong finds that a number of capsulated bacilli can be fairly well separated into two quite distinct groups, the Friedländer group and the aërogenes group. The members of the Friedländer group present in the tissues and exudates more distinct and easily stained capsules and mucoid halos or pseudocapsules on artificial media; they produce most gas on saccharose, less in glucose, and little or none in lactose bouillon; milk is not coagulated, and there is but slight or no acid produced in lactose media. Here belong the larger number of the encapsulated bacilli. The aërogenes group, so called because of the similarity of the organisms to the bacillus lactis aërogenes, which resemble on one hand Friedländer's bacillus and on the other the colon bacillus, includes the bacillus of Pfeiffer and B. mucosus capsulatus septicus. These bacilli and B. ærogenes lactis have no pseudocapsules, coagulate milk rapidly, produce gas more constantly and abundantly, and acids in equal amounts in all three media. In reality there are but two primarily distinct organisms, the bacillus of Friedländer and the bacillus lactis aërogenes. The varieties described are probably all accounted for by the well-recognized tendency of bacilli to vary within certain limits.

The Bacillus Aerogenes Capsulatus. The observations upon this extremely interesting organism are multiplying quite rapidly. Charles Norris[3] reports its isolation in six cases which illustrate its principal modes of entrance into the body either through the genital tract of women after abortion, during or after child-birth, as a terminal infection or as a local infection causing circumscribed gaseous phlegmons, with or without subsequent general invasion. Reuling and Hering[1] describe an instance of gas cysts, or holes in the brain, undoubtedly due to the preagonal or post-mortem invasion of this bacillus. Cultures were not made, but bacilli in all respects like the aërogenes were present in the tissues. The authors believe, and with much reason, that such cases must have occurred before, having probably been explained upon different grounds. As likely examples of this sort they mention two cases of holes in the brain described by Savage and Hale White,[2] who obtained the brain from two general paralytics whose other internal organs were also riddled with cavities, and hence regarded as instances of "universal cystic degeneration."

---

[1] Deutsche Archiv für klinische Medecin, 1899, lxiv., 590.

[2] Centralblatt für Bakteriologie, Abth. I., 1899, xxv., 625.

[3] American Journal of the Medical Sciences, February, 1899.

Wm. T. Howard, Jr.,[3] describes a fatal case of acute purulent cerebrospinal meningitis and cerebral abscesses, with gas holes in the cerebrospinal exudation, the cerebrum, and the liver, due to the bacillus aërogenes capsulatus, which was isolated in pure culture from all the organs. No other organisms were discovered after careful search, and Howard, therefore, concludes that in this case all the changes, necrotic and exudative, were due to the bacillus aërogenes which entered the body during life, probably through a surgical wound in the perineum made to relieve purulent infiltration with urinary fistula. Very likely the development of gas occurred after death, inasmuch as it seems that the gasogenic property of the bacillus may remain in abeyance when the organism is present in the blood and internal tissues during life. This is illustrated in the case of chorea insaniens described by Gwyn,[4] in which the bacillus aërogenes was repeatedly isolated from the blood during life, the first time thirteen days before death. In this case, which is the first in which the presence of this organism in the blood during lifetime has been demonstrated by cultures, there was no gas produced during life; in the absence of a post-mortem its exact pathogenic relations cannot be stated. In one of Norris' cases Ewing found large bacilli, resembling the aërogenes, in the blood three days before death, but cultures were not made. These observations indicate that this organism is one of wide distribution. Nothing has yet been learned concerning the frequency of its occurrence in the digestive tract nor of its natural habitat. Muscatello and Gangitano[5] claim that the B. aërogenes capsulatus is without pathogenic action on healthy tissues, but that it produces gaseous gangrene when it comes in contact with the tissues of reduced vitality. It causes death from toxæmia, and post-mortem it spreads throughout the body.

---

[1] Bulletin of Johns Hopkins Hospital, 1899, x.

[2] Transactions of the Pathological Society of London, vol. xxxiv.

[3] Bulletin of Johns Hopkins Hospital, 1899, x.

[4] Ibid.

[5] La Riforma Médical, 1898, i., 53.

A New Anaerobic Bacillus of Gangrene Foudroyante. Hitzmann and Lindenthal[1] describe an anaërobic bacillus which they isolated in four of five cases of gangrene foudroyante. It is a large bacillus with rounded ends, staining by Gram's method, non-sporogenic, non-capsulated, and immotile. It produces gas both from carbohydrates and proteids, and is pathogenic for guinea-pigs, producing the same lesions as in man, while rabbits are refractory and mice frequently so. It is widely distributed in nature, and occurs in the intestinal contents.

The Bacillus Tetani. Von Ottingen and Zumpe[2] confirm the observations of Nicolaier, Dor, and Hochsinger, that tetanus bacilli may occur in the blood and internal organs far away from the point of primary infection. They found the bacilli in the heart's blood and in the spleen, as well as elsewhere, in twenty out of forty-five animals which succumbed to subcutaneous inoculations. This dissemination occurred most often when the tetanus bacillus was injected in mixture with other bacteria. These observations also show that under certain conditions the tetanus bacillus may grow aërobogically, and Valagussa[3] states that this bacillus does not then produce any tetanus toxin.

The Action of Streptococci and their Toxins upon the Various Organs of the Body. Homén and his pupils publish an extended study[4] of the actions of a particularly virulent streptococcus and its toxins upon all the organs of the body except the blood, spleen, and bone-marrow, the toxin being secured in concentrated form from bouillon cultures by precipitation either by ammonium sulphate or amyl alcohol.

Among the general effects noted during this extensive study of the streptococcic action may be mentioned emaciation, an irregular fever, and a gradual cachexia due to the toxæmia.

The number of new points brought out in this investigation are not perhaps so striking, but the results emphasize many features in the pathology of infection, especially such as relate to the manner in which degeneration and necrosis, followed by connective-tissue proliferation, are produced, to the phagocytic action of the pulmonary epithelium to the functions of the peribronchial glands, and the relation of the protective powers of the peritoneum to the virulence of the infecting organism. While the results obtained in rabbits are not directly applicable to the conditions in human infections, yet the general facts brought out undoubtedly help us to understand better the hitherto obscure mechanism of the production of sclerosis and visceral scars. The theory of an ascending neuritis receives strong support; some light is thrown upon the nature of peritonitis and upon the causes of the various modes of termination of peritoneal infection.

---

[1] Archiv fur klinische Chirurgie, 1899, lix.

[2] Deutsche Archiv fur klinische Medecin, 1899, lxiv., 178.

[3] Annale d'igiene sperimentale, 1898.

[4] Ziegler's Beiträge, 1899, xxv., 1

Another example of interstitial myocarditis due to the direct action of microbes and their products has been brought forward. Hallwachs,[1] in some studies from the Leipzig clinic on the general pathology of the circulatory disturbances in acute infectious diseases, brings forward facts to show that the much feared post-diphtheritic death depends upon heart failure due to myocardial lesions of similar nature as those above described and of toxic origin. On the other hand, the circulatory disturbances observed at the height of acute infections are interpreted by Romberg and his associates[2] as due to the paralytic action of the poisons upon the vasomotor centres. They reach this opinion from a study of the action of the micrococcus lanceolatus and bacillus diphtheriæ upon the circulation in the rabbit, believing that the results obtained are applicable to human pathology by reason of analogy. Cardiac weakness coming on after the infection subsides is explained as being due to the development of myocardial lesions.

The Blood in Sepsis, Pneumonia, Meningitis, and Chronic Diseases. From the study of cultures from the blood in septicæmia, pneumonia, meningitis, and chronic diseases, F. W. White[3] reaches the conclusion that blood for bacteriological examination during life should be taken directly from the veins and in considerable quantity; that the resorption of toxins is the most important feature of sepsis, pyogenic bacteria invading the general circulation in a rather small proportion even of severe cases, and generally late in the course of disease. Hence the value of blood cultures for diagnosis in obscure cases of sepsis becomes limited. Negative blood cultures do not, of course, exclude local infection. The presence of specific bacteria in the blood in sepsis and acute lobar pneumonia, in the late stages of which a general infection with the pneumococcus occasionally occurs, means an unfavorable prognosis. In chronic diseases local terminal infections are more frequently the immediate cause of death than, as ordinarily supposed, are general infections. Agonal invasion is probably more uncommon than currently taught. In late autopsies bacteria in organs are often due to post-mortem extension from one organ to another, and in other cases to post-mortem growth of small numbers of germs originally distributed by the circulation.

[1] Deutsche Archiv für klinische Medecin, 1899, lxiv.

[2] Ibid., 1899.

[3] Journal of Experimental Medicine, 1899, iv., 426.

DISTURBANCES OF THE CIRCULATION.

Thrombosis and Embolism. The subject of thrombosis and embolism has received a comprehensive and masterful consideration at the hands of Welch in Allbutt's *System of Medicine*, 1899, vol. vii. This article will long remain a rich source of information and instruction in regard to all the various topics connected with these processes. At this time I shall direct attention only to the evidence which is accumulating in favor of the view that the blood-platelets are derived from red blood-corpuscles, and that the latter play a more important part in the development of thrombi than has heretofore been taught. During the course of the year two articles have been published from Arnold's laboratory bearing upon these points—one by Feldbausch,[1] the other by Arnold[2] himself.

Feldbausch shows that coagulation is directly influenced by salt solutions of varying concentration, and that the process is associated with correspondingly varying yet definite changes in the red corpuscles. The same apparently close connection between the changes in the red corpuscles and coagulation is shown to exist when the blood is treated with solutions which delay or hinder coagulation, as infusion of leeches. Naturally, the author does not mean to hereby exclude the leucocytes from all influence. Arnold's careful study of the morphology of disintegration products of red corpuscles, both outside the body as well as within the vessels of the mesentery and omentum of living animals, establishes the very probable identity with the blood-platelets of some of the bodies which separate from the red corpuscles by processes which are designated as plasmoschisis, or erythrocytoschisis, and plasmorrhexis, or erythrocytorrhexis. In addition, substances in solution may escape from the red corpuscles, which are then changed into " shadows " and other forms, or disappear entirely. This is called plasmolysis. In both these sets of changes—the extrusion of solid particles and plasmolysis—fibrin different structurally as well as tinctorially is formed, smooth threads, threads partly or wholly granular, threads containing platelets, and fragments of red corpuscles, showing that a very close relation exists between fibrin formation and the red corpuscles. These changes occur both outside as well as within the circulation, and without the necessary participation of the leucocytes. All recent investigators agree that the masses constituting the youngest plugs which form in circulating blood are composed of platelets which, as Arnold shows, are derived from changes in the red corpuscles, and produce fibrin or fibrinoid substances.

---

[1] Der Einfluss verschiedener Stoffe auf die rothen Blutkörperchen und die Bedentung der letzeren für die Gerinnung, Virchow's Archiv, 1899, clv. p. 135.

[2] Zur Morphologie de intravascularen Gerinnung und Propfbildung, loc. cit., p. 165.

The distinction, therefore, between the conglutination of blood-platelets and coagulation proper, as made especially by Eberth and Schimmelbusch, does not seem to be as fundamental as claimed by some writers. Arnold would distinguish these processes to this extent: That in coagulation, fibrin is formed by the precipitation of substances which have passed out of the red corpuscles in a dissolved state after the type of plasmolysis, whereas in conglutination small particles of nucleo-proteid nature are liberated which, on disintegration into a finely granular mass, furnish the material for the formation of fibrin. I would ask, Can we go a step further and regard the solid particles as the result of a kind of coagulation necrosis within the corpuscles, and do such intracorpuscular coagulation phenomena form the beginning of the process of thrombosis? At all events Arnold's studies furnish strong evidence in favor of regarding the formation of platelets as the first morphological phase of coagulation not only in circulating blood, as suggested by Welch, but also in extravascular coagulation. To what extent the demonstration of Arnold and others, that the red corpuscles play such a prominent part in fibrin formation, will lead to our disregarding the leucocytes in our explanation of fibrin formation remains to be seen. That leucocytes form a conspicuous constituent of many thrombi remains unquestioned. The production by the red corpuscles of soluble fibrinoid substances may induce the deposition of fibrin around leucocytes and endothelial cells in such a manner as to reproduce the centres of coagulation described by Zenker and Hauser, in which the cells mentioned form the centres of radially arranged fibrinous threads. Inasmuch as in the early stages the cells do not show any degenerative changes, Arnold holds that while one cannot deny the participation of the leucocytes in the coagulation, yet we lack definite evidence of a morphological character that such is the case. He furthermore holds that the development of fibrinoid degeneration of leucocytes and endothelial cells, or of fibrin within them, and the direct formation of fibrin by their disintegration, has not yet been definitely shown to occur, but at the same time it is not disclaimed that such cells may contribute to the formation of fibrin by the liberation of ferments or other chemical substances.

HEPATIC INFARCTION. As a rule, thrombosis, or embolism of the intrahepatic branches of the portal vein or hepatic artery, is not followed by marked circulatory disturbance, because apparently of free communication between the capillaries. Chiari[1] refers to seventeen instances of the rare so-called atrophic red infarct of the liver, fifteen of which were induced by embolism of the portal vein, two by local thrombosis in the larger branches of the portal vein, the hepatic veins appearing pervious.

---

[1] Verh. d. Deutschen Path. Gesellschaft, Erste Tagung, Sept. 19–22, 1898. 1899, 13.

The infarcts were wedge-shaped, dark-red, sharply defined, varying in size from a pea to a man's fist. Microscopically the areas showed, mainly, capillary dilatation, with atrophy of the liver-cells ; coagulation necrosis was not observed ; in two hemorrhage had occurred.

The genesis of these areas does not seem quite clear. Chiari states that they result from obstruction in the portal branches associated with low blood-pressure in the arteries and congestion in the veins, and Orth is of the same opinion. There is no evidence that the areas undergo cicatrization or form cavernous tumors, as claimed by Jores,[1] in the case of the bovine liver. Possibly some degree of induration might result, and in some cases it is probable that they might disappear. In two cases of embolic obstruction of the interlobular branches of the portal vein typical anæmic infarcts with necrosis of the liver-cells, but not of the connective tissue, developed. Similar infarcts, partly anæmic, partly hemorrhagic, with necrosis of the connective tissue as well, resulted from embolism of the smallest branches of the hepatic artery.

The development of necrosis under these conditions is not clearly explained. I would suggest that possibly capillary obstruction also results in such cases of occlusion of the smaller branches of the hepatic vessels.

Finally, Chiari mentions an instance of necrosis of the whole liver following embolic obstruction of the main stem of the hepatic artery beyond the origin of the pyloric branch (A. coronaria ventriculi.)

OBLITERATION OF HEPATIC VEINS. Chiari[2] describes three cases of primary obliterating phlebitis of the principal branches of the hepatic veins, death resulting directly or indirectly from the consecutive circulatory disturbance. The endophlebitis localized itself in the proximal parts of the veins, with, in one case, peripheral extension ; the tendency to obliteration was marked, resulting in mechanical obstruction to the blood-flow and fatal secondary thrombosis. Associated in one instance with similar changes in the coronary arteries, the cause of the hepatic endophlebitis, whether of syphilitic or other nature, is as yet beyond ken.

INFARCTION OF THE HEART. Baumgarten[3] succeeded in producing artificial cardiac infarcts in cats and dogs by ligating various branches of the coronary arteries. He found that the physiological distribution of the arteries outlined by this method corresponds quite clearly with the results obtained by anatomical study. Two arterial branches may supply parts of the same area and still be quite independent of each other. An important result of this investigation is the demonstration that the area of the muscle rendered anæmic may retain its power of contractility for at least eleven hours. This was shown by cutting out the ischæmic area and feeding it with defibrinated blood through an arterial branch. Baumgarten suggests that there may be material enough present in the muscle for contraction for a time after the ligation, and that the feeble regurgitant circulation from the surrounding veins for a brief space may furnish some of the necessary pabulum.

---

[1] Verh. d. Deutschen Path. Gesellschaft, Erste Tagung, September 19-22, 1898, p. 17.

[2] Ziegler's Beiträge, 1899, xxvi., 1.

[3] American Journal of Physiology, 1899, ii., 243.

Porter has shown that each cardiac contraction empties the intramuscular vessels. If the anæmic area in infarction contracts for a time the vessels would be emptied with each contraction, and during diastole filled again from the coronary veins and the vessels of Thebesius. While the blood thus supplied is not able to prevent ultimate necrosis, yet it may be of great service in the gradual closure of the arteries, as must often be the case in infarction in the human heart. In only a few cases were Baumgarten's experimental infarcts hemorrhagic. The margins were often irregular, and the infarcts corresponded in this and other respects to the appearance generally presented by human infarcts. The infarcted areas were generally white or whitish-yellow, opaque, and flaccid, the part of the heart-wall involved being more or less dilated. The connective tissue remained unchanged longer than the muscle.

INFARCTS OF THE KIDNEY. Ribbert[1] shows that renal infarcts are more or less wedge-shaped only when they involve the cortex and medulla, those involving the cortex only being more quadrilateral. In the smallest infarcts some of the connective tissue and some of the tubules may remain alive. A typical infarct becomes surrounded by three zones, an inner and white, due to cell infiltration ; a middle and red, due to hyperæmia, and an outer or white, due to partial necrosis, in which the nuclei are earlier dissolved than elsewhere because of the presence of a lymph-current. The hyperæmic zone is due to the influx of blood by way of the capillaries. The cellular infiltration is important in so far as it checks the influx of blood ; the outer zone remains whitish because of the partial necrosis and because the blood can leave it easily. The uriniferous tubules which escape necrosis are lined with cubical cells in which mitotic figures may occur, but the proliferative changes are not sufficient in extent to be of any functional importance.

INFLAMMATION AND PROGRESSIVE CHANGES.

The Plasma Cell. There is but little concerning the plasma cell to add to what was said in PROGRESSIVE MEDICINE for March, 1899. Ivannoics[2] distinguishes between two forms—namely, (1) a round or oval plasma cell, which may send out short processes, the nucleus being deeply stained and presenting coarse parietal granules, and (2) an oval, spindle-shaped cell with numerous processes and not unlike connective tissue cells; the nucleus is long and the chromatin granules more lightly stained than in the first. He derives the first from polymorphonuclear leucocytes and lymphocytes, and the second from connective tissue cells, and claims that this cell only can form new connective tissue.

---

[1] Virchow's Archiv, 1899, Band clv.

[2] Zeitschrift für Heilkunde, 1899, xx., 159.

In his investigation of the morbid anatomy of scarlet fever, Pearce[1] brings out the interesting fact that in this disease, as in diphtheria, the spleen and the lymph-nodules are the seat of great production of plasma cells, which are also found in the lungs and in the kidneys where the condition is one of acute interstitial nephritis similar to that described by Councilman in diphtheria.

The relation of the plasma cells to the toxins of scarlet fever, diphtheria, and like diseases, it seems to me, is fast becoming a very interesting question.

Gherardini's[2] conclusions in regard to the mast cell are that it is the same as the plasma cell, originates from the leucocytes, and which, during their phagocytic activity, retain some of the products of cell disintegration. These remnants are granular and stain like chromatin. The differences between the mast cell and the plasma cell are simply different stages in the development of the same cell. The mast cell changes into a fixed connective tissue cell.

Fibrinoid Degeneration of Connective Tissue. The relation of the connective tissue fibres in serous membranes to the formation of fibrinous exudate has again been studied, this time by Georgiewsky,[3] in Ziegler's laboratory, by means of injection of solutions of iodine. During the first twenty-four hours after injection especially, appearances are presented that might be mistaken for a fibrinous degeneration of the connective tissue, such as Neumann claims takes place in fibrinous inflammation of serous membranes. The connective tissue fibres swell up and are loosened, the lymph-spaces are widened, and leucocytic infiltration takes place; but although the fibres now take the fibrin stain, the bands always remain distinct and do not form part of the exudate. Iodine, especially in strong solution (equal parts of tincture of iodine and water), produces a necrosis of the endothelial cells and comes in direct contact with the underlying fibrous tissue, which now becomes changed, and is infiltrated with exudate to the extent that the fibres take up the fibrin stain.

---

[1] Boston City Hospital Reports, 1899, x.

[2] Policlinico, 1898, No. 13, abstract in Centralblatt für Allgemein Pathologische, etc., 1899, x. p. 510.

[3] Ziegler's Beiträge, 1899, xxv., 447.

Elastic Fibres. From his study, by means of Weigert's new stain for elastic fibres, of the thickening in the intima in endarteritis produced in consequence of double ligature of the carotid in dogs and rabbits, Jores[1] concludes that new elastic fibres are formed directly by the cells rather than on account of chemical changes in the collagenous substance.

Abramow[2] shows that many new elastic fibres develop in the intima in syphilitic proliferations in the vessel walls after a quiescent stage has been reached. This development of elastic tissue must be regarded as compensatory in its nature.

The Change of Epithelium into Connective Tissue. Leo Loeb,[3] in a study of the processes which take place in transplantation of skin in the guinea-pig, describes certain morphological appearances which are interpreted as denoting the direct transformation of epithelial cells into connective tissue. The nucleus of the deeper epithelial cells is described as assuming the more rod-like form characteristic of connective tissue, and the body a spindle-shaped, elongated form, the protoplasm staining with eosin, so that it was no longer possible to distinguish the changed epithelial cells from the cells of the connective tissue. In a matter like this, which involves a radical revision of the long-accepted teaching of the specificity of the cells after a certain degree of differentiation has taken place in the embryo, one naturally becomes very critical, and, disregarding for the time references to plausible analogies in lower animals and fascinating theoretical considerations, it must be said that conclusive proof has not been furnished that this transformation of epithelial cells into connective tissue actually occurs in the guinea-pig under the conditions described. It seems to me that two points deserve special notice: First, the original form of the epithelial cell is more or less cylindrical. Under abnormal conditions a reversion to this form may occur in the sense of Hansemann's anaplasia. Secondly, the conditions under which rapid cell proliferation occurs in the transplanted skin offer mechanical reasons for changes in the form of the epithelial cells. I think the appearances described by Loeb are more naturally explainable along these lines than as due to a direct change of the epithelial cells into permanent connective tissue. Wentscher,[4] in his studies of the changes in transplanted human epithelium which was first kept outside of the body for a time, also mentions that the new cells assume cylindrical and spindle-shaped forms with rod-shaped nuclei. This he attributes to the influence largely of pressure upon the embryonal cells. And Raehlmann[1] calls especial attention to the marked individuality presented by the epithelial cells of the mucous membrane of the human lip when bits of this are transplanted upon the eyelids, the distinctions between the two kinds of epithelium remaining very marked.

---

[1] Ziegler's Beiträge, 1898, xxiv., 458.

[2] Ibid., 1899, xxvi., 202.

[3] Medicine, 1899, and Transactions of Chicago Academy of Medicine, Journal of American Medical Association, April 15, 1899.

[4] Ziegler's Beiträge, 1898, xxiv., 101.

Regeneration of the Mucous Membranes of the Urinary and the Gall-bladders. Cornil and Carnot[2] publish some very interesting experiments in connection with the urinary and gall-bladders of the dog, going to show that these structures have a marked power of regeneration. This is shown especially well in regard to the epithelium lining the urinary bladder. Placing an absorbable ligature around the bladder, so as to divide it into two compartments, of which the lower would discharge the functions of the bladder, experiments of various kinds were made upon the fundus. An experiment which strikingly shows the reproductive power of the vesical epithelium consisted in amputating the fundus and covering the defect with omentum. After almost two weeks apparently complete union occurred, and the entire vesical aspect of the omental graft was covered with typical epithelial membrane, the epithelium creeping into all the depressions and pouches of the omentum. While suturing the small intestine to the bladder the needle accidentally punctured both the mucous membranes. Later the microscopical sections showed that the bladder epithelium had crept along the track of the suture through the walls of both bladder and intestine clear to the submucous coat of the latter, where it abruptly met the down-growing intestinal membrane, thus showing the far greater proliferative power of the vesical epithelium. The latter, during its invasion, sent branching masses into all loose spaces, giving rise to appearances seen in carcinoma.

The margins of an unsutured incision into the gall-bladder, after ligature of the cystic duct, were found to have a great natural tendency to union and the restoration of the bladder, even after this had been divided into two, each half having turned outward.

Regeneration of Peripheral Nerves. The part played by the cells of the sheath of Schwann in the regeneration of nerves has come to be a moot question. Von Bungner, Galeotti and Levi, P. Ziegler and von Wieting have claimed that these cells are a kind of neuroblast whose protoplasm in regeneration gives origin to parts of the new axis-cylinders which are formed by the union of discontinuous pieces and not by mere down-growths of the central end of the cut nerve, as held by the older writers and by recent investigators like Stroebe, von Notthaf, and Kolster. Nor has the relation of Schwann's sheath to the myelin sheath been clear. Kolster and Huber traced the formation of the myelin in the regenerating nerve to differentiation in the protoplasm of Schwann's cells, while others held that the myelin sheath grows down simultaneously with the axis-cylinders.

---

[1] Ziegler's Beiträge, 1899, xxv., 143.

[2] Régénération cicatricielle des cavités muqueuses et de leur revêtement épithélial, Archives de Médecine Experimentale, 1899, xi., 413.

We have been in need of observations upon the histogenesis in the embryo of both Schwann's sheath and the medullary sheath before these questions could be cleared up, and Kolster[1] now brings forward certain facts which seem to place these matters in their proper light. In *salmo trutta* and *sterna hirundo* the peripheral nerves emerge from the spinal cord as bundles of fine fibrillæ which push the covering of the cord before them. Medullary sheaths develop in the spinal cord at a time when its framework is constituted wholly by the ependymal cells, and in the outgrowing nerve bundles before any nuclei have appeared in them—in other words, the myelin is developed before there is any trace of Schwann's sheath. It is true that in birds and rabbits some cells appear within the nerve bundles before there are any medullary sheaths, but these cells do not appear to bear any relation to the sheaths. Schwann's sheaths are formed from the connective tissue from which fibroblasts pass in among the nerves. This connective tissue is derived from the covering of the spinal cord. There is no structure corresponding to Schwann's sheath in the spinal cord, so that taking these facts altogether we must regard the medullary sheath as an ectodermal product, just as we do the axis-cylinder and Schwann's sheath as mesodermal formations. The exact mode of formation of myelin has not yet been determined. Now, parts without any histogenetic relation or connection with the nerves, such as the cells in Schwann's sheath, can hardly serve as the matrix for purely nervous structures in regeneration, and the view that axis-cylinders and medullary sheaths are formed by continuous regeneration of the old would seem to be one which harmonizes best with the facts at hand and with our present conception of the neuron. Nevertheless, the cells of Schwann's sheath are not wholly without function in regeneration, but act as phagocytes in removing the detritus of the degeneration of the severed nerves. Kolster also points out that the changes observed in the body of the ganglion cells after division of the neuron are probably of a progressive or regenerative character incident to the new activities set in motion to promote regeneration.

---

[1] Studien über das centralen Nervensystem, I Ueber das Rückenmark einige Teleostier, Berlin, 1898; Ziegler's Beiträge, 1899, xxvi., 190.

RETROGRESSIVE CHANGES.

Hypoplasia of the Adrenals and Hydrocephalus. Czerny[1] observed that when a solution of Berlin blue is injected into the cerebral ventricles of young rats the fluid emerges from the cerebro-spinal canal first through a lymph vessel which sends a branch to the adrenals and then passes on to a pelvic lymph-gland. This led to a study of the adrenals in congenital hydrocephalus. To his great surprise, he found that in five cases of hydrocephalus the adrenals which appeared quite normal to the naked eye did not contain any medullary substances, the cortical layers being separated from each other by a few veins only. In twenty healthy infants the adrenals showed no such anomalies. There seems, therefore, to be some reason to believe that there exists a certain relationship between aplasia of the adrenal medulla and the development of hydrocephalus, the exact nature of which must be more closely determined by further investigations.

Fatty Degeneration. A. E. Taylor,[2] after a careful review of the original work bearing on the doctrine of fatty degeneration, reaches the conclusion that the origin of fats from proteids has not been demonstrated, the weight of evidence being rather in favor of regarding the so-called fatty degeneration as an infiltration of fat from carbohydrates. Taylor[3] reaches the same conclusion—namely, that it has not been shown that fat is ever formed from cellular protein—from a research into the origin of fat from protein in the so-called fatty metamorphosis of phosphorus-poisoning, the animal used being a frog.

In a study of pathological fat formation from Ziegler's laboratory, W. Lindemann[4] divides the field before him into physiological and pathological lipogeneses.

Physiological lipogenesis is, above all things, marked by the absence of any deep-seated disturbance of the functions and real structure of the cell involved, and it generally occurs at the expense of imported material, although it seems not improbable that in the secretion of milk the cell protoplasm is drawn upon.

In degenerative lipogenesis, on the other hand, the fat is probably formed from the constituents of the cell which suffers severe protoplasmic and nuclear lesions. Lindemann presupposes that fat can form from albumin, but with full knowledge that Pflüger, Rosenfeld and others hold, as set forth in Taylor's review, that this is not demonstrated. Lindemann lays stress on the formation of fats from proteids by bacteria, as is supposed to occur in the formation of adipocere, and which might therefore occur in infections, and on the post-mortem lipogenesis in aseptically conserved tissues and organs as described by Hauser, Lubarsch and others, and also demonstrated by Lindemann himself to occur in the epithelial cells of the skin of dead bodies.

---

[1] Centralblatt für Allgemein Pathologie, 1899, x.

[2] American Journal of the Medical Sciences, May, 1899.

[3] Journal of Experimental Medicine, 1899, iv.

[4] Ziegler's Beiträge, 1899, xxv., 392.

Granting a true degenerative lipogenesis in which the fat is formed from the cell protoplasm, does the morphological study of suitable material throw any light upon the question? Much stress is laid on the size of the fat drops, fatty degeneration being considered as marked by the presence of fine droplets of fat in the cell, but the size of the globules has been found an insufficient distinguishing characteristic. In conditions of fatty degeneration, however, there are usually more or less well-marked nuclear changes. When 0.5 to 1 of oleum pulegii is injected into a rabbit there is produced fatty degeneration of the parenchymatous organs, especially in the kidney, the protoplasm of the cortical cells being filled with fine dust-like fat granules. The nuclei are then smaller than normal, deeply stained, angular, lie near the cell wall, and in more chronic intoxication fragmentation of the chromatin often occurs. So it would seem that the formation of fat under normal and pathological conditions takes place in ways different from each other and is associated with different histological changes. Much light would undoubtedly be thrown upon these problems by a chemical study of fat, especially of that formed in degenerative changes and also in the breast during secretion of milk. It seems probable that fat formed from albumin will be found to have distinct peculiarities. The post-mortem development of fat has not been sufficiently studied, although this phenomenon is presumptive evidence in favor of the origin of fat from proteid.

As pointed out by Taylor, even though we concede that fat is formed in degenerated cells, it can still be urged that it is produced from carbonous compounds — sugar, glycogen, glucosides, and mucin—which abound in cells rather than from the proteids—a contingency which Lindemann does not lay enough weight on. The process of lipogenesis is by no means as simple as usually taught in the college and text-book. When the phrase "fatty degeneration" is used, as it will be, it should perhaps be rather in the sense of cell degeneration with the formation of fat than of cell degeneration directly into fat.

Pancreatic Autodigestion. Pförunger[1] confirms the observations of Chiari[2] that the pancreas may digest itself either post-mortem or during the death agony. This property is the more marked the more normal the gland, and appears to be increased when the gastro-duodenal mucous membrane is the seat of functional hyperæmia. After death the zymogen may, in the course of hours, produce active ferment in larger quantities, and more extensive digestion may then take place. Autodigestion during life, which occasionally occurs, is succeeded by an inflammatory reaction. Fat necrosis may induce digestion by the exit of pancreatic secretion from small areas of gland tissue affected by the necrotic changes in their vicinity.

---

[1] Virchow's Archiv, 1899, clviii., 126.

[2] Zeitschrift für Heilkunde, 1896, xvii.

Hæmochromatosis and Bronzed Diabetes. Eugene L. Opie,[1] in his study of hæmochromatosis based upon the investigation of a case of hæmochromatosis, cirrhosis of the liver, and chronic interstitial pancreatitis, reaches the conclusion that hæmochromatosis is a distinct disease, and that the interstitial changes in such organs as the liver and the pancreas are secondary to the degeneration of the cells on account of the accumulation of pigment. When the chronic interstitial pancreatitis reaches a certain degree diabetes develops. Diabetes was absent in Opie's case. I have recently studied the tissues from a case of this kind in a man, aged forty-two years, in whom diabetes was present during the time that the patient was under observation in the Cook County Hospital, Chicago. The pigmentary and cirrhotic changes in both the liver and the pancreas were very marked. The fact that diabetes may be absent in these cases seems to argue against the French view of their pathogenesis—namely, that the diabetes is the prime factor in causing the pigmentation. The view advocated by Opie, that the excessive pigment production precedes the development of diabetes and cirrhosis, appears to me to be more rational and to furnish a better starting-point for the study of the genesis of the pigment. According to Anschutz[2] there are now some twenty-four cases of hæmochromatosis and bronzed diabetes recorded. Adami[3] gives the only case on record which has occurred in a woman. He tentatively expresses the view that the breaking down of the red corpuscles and the liberation of pigment occurs in the intestinal walls and vessels.

Degeneration Micans of Glia Tissue. In a case of glioma in the lower cervical region described by Hudson[4] there occurred a peculiar form of degeneration which is considered in detail by Barker.[5] It concerns the presence of large and small, variously shaped, glistening masses due to degenerative changes in the glia. Rosenthal[6] describes quite similar bodies in a tumor of the cord associated with syringomyelia. On account of their tendency to assume the shape of small bulbs and flasks, Rosenthal speaks of the change as "kolbige degeneration." Rosenthal could not make out any relation between the bodies

---

[1] Journal of Experimental Medicine, 1899, iv.

[2] Deutsche Archiv für klinische Medecin, 1898, lxii., 411.

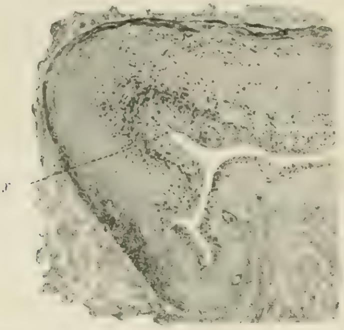
[3] Transactions of Association of American Physicians, 1899, xiv., 277.

[4] American Journal of the Medical Sciences, June, 1899.

[5] Ibid.

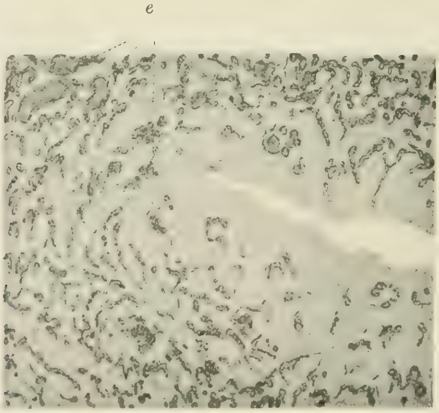
[6] Ziegler's Beiträge, 1898, xxiii., 111.

FIG. 28.



Section through half of stem of new growth, showing part of cavity and distribution of the larger masses of glistening degeneration (degeneratio micans). Müller's fluid, hardening, colloidin section unstained, mounted in salty glycerin. Magnification of 10 diameters. The branch of the cavity marked x corresponds to the portion seen under higher power in Fig. 29. (HUDSON, BARKER, and FLEXNER.)

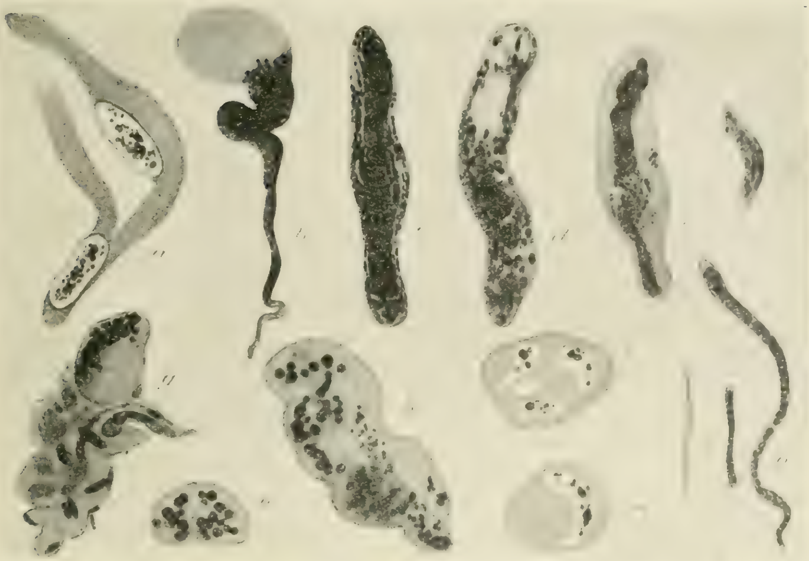
FIG. 29.



Higher magnification of a part of the same preparation represented in Fig. 28. *e*. Bloodvessels. The masses of the glistening substance assume various forms. A large number of pale swollen fibrils containing none of the refractive substance are indicated. Near the central cavity the coagulated albumin is seen. Magnification of 62 diameters (Zeiss, Compens. Oc. 4, Apochr. Obj. 16 mm.). (HUDSON, BARKER, and FLEXNER.)

and the cells, while Barker shows clearly that a large proportion undoubtedly occur within bipolar cells. With the Weigert-Pal method the masses stain black ; with Van Gieson's method red, yellow, or yellowish-green, depending on the degree of differentiation, and with iron hæma-

FIG. 30.



Series of drawings representing elements selected from a Weigert-Pal preparation of the tissues pictured in Figs. 28 and 29. Magnification of 500 diameters (Zeiss, Compens. Oc. 4, Apochr. Obj. Oil imm. 2.0 mm.).

a. Parts of two swollen bipolar cells met with in one field of the microscope. These two cells do not contain the glistening substance. The nucleus is in both placed excentrically, this being obvious in the one cell seen "in profile."

b. Part of long bipolar cell in large part converted into the glistening substance, here stained black. At the thick extremity is a drop of protoplasm showing none of the degeneratio micans.

c. Part of a swollen bipolar cell showing a black core with peripheral, nearly parallel, rows of dots and rods of the black substance.

d. Part of a bipolar cell showing rows of drops and rods, as well as several large drops of the blackened substance. A few very pale areas are visible in the protoplasm.

e. Part of bipolar cell showing central core of substance stained black, which at one end of the figure is resolved into a bundle of parallel rows of black dots and rods. There is a relatively large amount of swollen rather refractive protoplasm peripherally placed, which is free from degeneratio micans.

f. A small bundle of interrupted black lines of the stained glistening substance embedded apparently in a common ground mass of protoplasm.

g. A complex of sections of fibres of various sizes running in different directions. Fusiform masses of the black substance distinctly visible in some of them.

h. Cross section of a rather large bipolar cell showing transverse sections of the longitudinal rows of masses of the blackened degeneratio micans.

k. Large refractive mass containing particles of the blackened glistening substance. The protoplasm has apparently "run" into the form.

l, *m.* Sections of swollen bipolar cells containing sections of pale masses. Inside the latter are seen irregularly distributed droplets of the blackened glistening substance.

n. Two very fine fibres, both taken from a part in which all the elements in the tissue are swollen. One of the fibres is free from, the other contains, the substance which stains black in Weigert-Pal.

o. A rather fine fibre, showing fragments of the blackened substance. The upper thickened end of the fibre is seen in cross sections and on the cut surface is seen a central core, which consists of a homogeneous fused mass of the blackened glistening substance. (HUDSON, BARKER, and FLEXNER.)

toxylin a slate-gray or blackish-gray. In Rosenthal's case Weigert's fibrin stain gave a bright blue color to the masses after fixation in Zenker's fluid. Inasmuch as the alteration described is always associated with swelling and the appearance of masses with distinct staining reactions, Barker suggests the name *degeneratio micans*, or Rosenthal's degeneration, since the latter first described the special staining reactions. The various forms of the glistening masses are well shown in the figures taken from Barker's article (Figs. 28, 29, and 30).

TUMORS.

Statistics of Cancer and its Supposed Increase. This subject has of late attracted considerable attention.[1] Many writers maintain that cancer is rapidly on the increase in all parts of the world. Roswell Park, for instance, makes the following startling statement: "If for the next ten years the relative death-rates are maintained, we shall find in ten years from now—viz., in 1909—there will be more deaths in New York State from cancer than from consumption, smallpox, and typhoid fever combined."

In Great Britain, according to Spencer Wells, deaths from cancer have increased from 7245 in 1861 to 17,113 in 1887. Finklenburg, of Germany, who has collected the figures from various countries, gives the cancer death-rate for the year 1888 per 100,000 population as follows: Italy, 42.7; England, 60; Scotland, 60.7; Ireland, 41.9; Austria, 49.1; Holland, 69; and Prussia, 40.9.

LOCATION. Certain writers claim that cancers are infectious, and transmitted in the same way as tuberculosis, or that the disease may be propagated in a manner analogous to that in which malaria, as Manson and Ross have shown, is transmitted, both having a relation to a marshy soil. Writers, therefore, speak of "cancer districts" and "cancer houses." Behla, of Germany, speaks of the disease as being endemic in the town in which he lives. This town has a population of 5000, including a suburb of 1000. In this suburb there occurred from October, 1875, to April, 1898, 663 deaths, of which 73 were due to cancer, making a death-rate of 1 to 9. Most of these cases were confined to certain streets and houses; as many as four deaths occurred in a single house during the last twenty-two years. Recently, Behla has reported similar instances in neighboring villages. He also cites the cases of Behrens, who found in a village 10 deaths out of 38 due to cancer; and those of Pfeiffer, who found the proportion of the general death-rate to cancer as 1 to 7. This endemicity also prevails, according to various French writers, in certain parts of Normandy. Similar observations have been made by Powers, of England. He says: "It seems to cling to certain spots and groups of buildings irrespective of their size and age." Furthermore, he states: "In one village of 1036 inhabitants, among whom 42 cases of malignant disease occurred between the years 1872 and 1898, I find that four houses had each more than one case of cancer." Powers calls attention to the fact that the cancer was largely distributed in the digestive system. Out of the 173 cases reported by him, 49 occurred in the alimentary canal, 10 on the lip, and 22 in the liver. He also points out the fact that most of the cases occurred in a low marshy district, especially near streams which water the district. Behla found also in most of his cases that the seat of the cancer was in the stomach and liver, pointing to some source of infection gaining access to the body through the digestive system. In studying the locality he found the districts marshy, the streams and ditches sluggish, the water which was used for watering the garden vegetables and also for drinking purposes stagnant and polluted. Behla found in the water as well as on the vegetables (salads, cabbages, radishes) a parasite which he believes influences or causes the proliferation of tissue-cells. This belief is strengthened by the fact that cancer, according to Friesinger, is quite frequent in isolated houses at river banks and near woods, and because tumor-like growths which have been found on trees he also found on the roots of cabbages and other vegetables. Powers, however, does not believe that single houses or localities have any relationship between the condition of the house or of the soil and the origin of the cancer, but that there is undoubtedly some intermediate host whose chance of detection will increase or diminish with the care which is taken to examine the flora and fauna of the district where cancer is most prevalent.

---

[1] Robert Behla, Ueber vermehrtes und endemisches Vorkommen des Krebses, Centralblatt für Bakteriologie, 1898, Band xxiv. pp. 780, 829, 875, and 919; Die Geographisch Statistische Methode als Hülfsfactor der Krebsforschung, 1899, Band xxxii., Heft 1. A. Haviland, Medical Geography of Cancer, Practitioner, April, 1899 (cancer number). A. Newsholme, Statistics of Cancer, Practitioner, April, 1899. Darcy Powers, Local Distribution of Cancer, Practitioner, April, 1899. Roswell Park, A Further Inquiry into the Frequency and Nature of Cancer, Practitioner, April, 1899. Edmund Andrews, Supposed Increase of Cancer (a statistical error), Journal of American Medical Association, June 24, 1899.

While cancer is one of the most deadly diseases we have to deal with, it has not as yet been shown or proven to have materially increased. Most of the facts brought forward for its increase are drawn from the mortuary statistics. Now, as it has been pointed out by Andrews, the handling of vital and mortuary statistics is a difficult art, slight mismanagement leading to delusive results. Furthermore, as Andrews remarks: "The official documents are, by the confession of their compilers, full of great errors." This is a serious matter in attempting to prove an increase of cancer. That the official figures are really unreliable is illustrated by the following: The United States Census Report gives for the year 1890, 13.9 deaths per 1000 population, while the best registered countries of Europe rarely show a death-rate less than 18 per 1000 inhabitants. Now, the United States compilers being aware of this have arbitrarily brought the death-rate up to 18 per 1000. Similar mistakes have occurred in other countries. Another reason for the apparent increase of cancer may be added. Formerly, twenty to thirty years ago, internal cancer was but rarely diagnosed, but now such mistakes are less frequent. This is demonstrated by consulting the figures of the Registrar-General's Office, which show a great number of deaths formerly returned as old age appearing now under various nervous, circulatory, and digestive diseases, including cancer. Furthermore, as Newsholme (in his article on the "Statistics of Cancer") remarks: "The reason of the greater increase of cancer mortality among males confirms the view that the registered increase of cancer mortality is in large measure only apparent. The hypothesis that this is caused by the increased care in certification of deaths, associated with more accurate diagnoses which accompany more frequent autopsies, offers the most satisfactory explanation in view of the fact that cancer in the male is more frequently internal and difficult of diagnosis than in the female." Some writers explain the increase of cancer to the large number of persons who in these days of improved expectation of life survive to the cancer age.

The fact that our better knowledge of hygiene has diminished the death-rate of such diseases as typhoid fever, diphtheria, etc., would explain in a manner the apparent increase of cancer. For in estimating the ratio of deaths from cancer to deaths from all causes the reduction of deaths from such diseases as typhoid fever, etc., leaves the cancer ratio relatively larger and tends to the wrong conclusion of an actual increase of that disease.

Successful Inoculations of Tumors. Judging from the following successful inoculation experiments with growths currently regarded as tumors, I think it may said that malignant tumors, especially those now classed as sarcomas, very probably include peculiar proliferative processes caused by organisms whose exact nature has not yet been determined. The near future will undoubtedly witness the definite separation from the sarcomas of various distinct infectious growths, and it would not be surprising if in the end a large number of sarcomas were to resolve themselves into processes of parasitic origin. As is frequently remarked, sarcoma in its clinical and anatomical characteristics presents more and more marked analogies to chronic granulomatous processes than carcinoma. This is especially true of small-celled forms.

Jurgens[1] successfully inoculated the minutely rubbed-up parts of a round-celled sarcoma of the anterior mediastinum and pleura of a human patient into the left thoracic cavity of a rabbit, in the anterior mediastinum of which there developed a soft tumor the size of a walnut and of the structure of a small round-celled telangiectatic sarcoma. In this tumor in the rabbit he found numerous extremely small bodies, which he calls amœba, containing disintegrated red blood-cells and brownish pigment.

The same author[2] remarks that in successful inoculation of melanosarcomatous material the brownish-black pigment bodies appear to multiply and to extend into the tissues. Hence, the question has arisen whether these pigmented bodies are merely lifeless pigment or living organisms. Jürgens states that he has found very similar bodies in the mesenteric glands and the lymphatic tissues of healthy rabbits. These are organisms, he claims, which multiply by division and by spore-formation. Whether they are animal or vegetable parasites cannot be said. They grow in water which is colored brownish-black. In the discussion Marchand stated that he succeeded in the inoculation of a round-celled sarcoma of the stomach of a rabbit into the peritoneal cavity of a second rabbit, and from the latter into a third. Further experiments failed. Marchand is of the opinion that the proliferation was due to the cells introduced, which he says had a malignant character.

Smith and Washburn[3] detail some experiments made with certain naturally infectious growths, called by them infectious sarcomas, which occur in the genitals of dogs. Histologically, these growths resemble round-celled sarcomas. The authors made successful transplantations into the subcutaneous tissue, carrying the experiment through a series of dogs. The growths may disappear spontaneously without ulceration, after which the animals are immune to subsequent inoculation, or they may increase in size, cause secondary visceral nodules and death.

Otto Lanz[4] succeeded in producing warts experimentally by inserting into the skin finely chopped-up warts removed from the hands of a patient. By repeatedly rubbing the healthy finger against these warts the skin of the finger became infected. Efforts at cultivating organisms from the warts failed. He also claims to have successfully inoculated rabbits by the skin and intraperitoneally with parts of the wall of dermoid cysts, dermoid tumors the size of a cherry developing. Similar experiments with carcinomatous tissue, with benign mesoblastic tumors and with non-pigmented sarcomas gave only negative results. He obtained "positive" results with melanosarcoma once. Portions of the tumor were rubbed up with salt solution, and a few drops were injected into the spleen of a guinea-pig, which died seven weeks later. There was found in all the organs a large amount of free and intracellular pigment darker than that of the original tumor, and containing iron and sulphur. A small pigmented growth had developed in the muscles of the left ear. It seems to me that the most which can be said of this result is that a general melanosis developed. The result would seem, also, to favor Jürgens' idea that the pigment particles are micro-organisms.

---

[1] Verhandlungen der Deutchen Pathologische Gesellschaft, Erste Tagung, September 19, 1898.

[2] Ibid., p. 128.

[3] British Medical Journal, December 27, 1898.

[4] Deutsche medicinische Wochenschrift, May 18, 1899.

Implantation of Embryonal Tissue. Arthur Birch-Hirschfeld and Garten[1] have studied the changes in embryonal cells when implanted into the tissues of grown animals. The finely separated material of young embryos was injected into the liver and other organs of grown animals of the same species as the embryonic material. The animals used were goats, fowls, rabbits, salamanders, and frogs. In several instances tumor-like masses of new-formed cartilage developed in the lungs and in the liver. The implantation into fowls of embryos one to five days old was followed after a few weeks by the growth of a tissue of adenoid structure mixed with epithelioid and pigmented cells. While it is thus shown that embryonal cells are extensively differentiated in the adult body, yet the growth of embryonal tissue was but transitory and followed by retrogression, encapsulation, and absorption. Féré[2] has previously recorded that the implantation of chick embryos fifteen days old into the subcutaneous tissue of the chicken is followed by some further growth.

The Arsenical Origin of Carcinoma. Hartzell[3] has studied the development of carcinoma of the skin in cases of psoriasis treated with arsenic. There are eleven cases illustrating this course of events. In about half of the cases the carcinoma appeared before forty years of age, and in about that same number the tumor was primarily multiple. In the larger proportion of cases keratosis preceded the growth of the carcinoma. Generally the keratosis was of the palmar or plantar variety, as is frequently the case when arsenic is taken for a long time. The early appearance and the primary multiplicity of carcinoma in these cases point to some special etiological conditions which perhaps depend upon the arsenic taken. Perhaps this substance so acts on the epithelial cells as to modify their biological nature. There are numerous special conditions which appear to influence the development of carcinoma, and it is not unlikely that the study of small etiological groups of this kind may be of much value. The investigators in general are inclined to make everything subservient to some single, general theory.

---

[1] Ziegler's Beiträge, 1899, xxvi., 132.

[2] La Progrès Médicale, 1897, 414.

[3] American Journal of the Medical Sciences, September, 1899.

The Occurrence of Carcinoma in Lower Animals. M'Fadyean[1] discusses the general features of forty-nine cases of carcinoma in the lower animals; twenty-five were in the horse, sixteen in the dog, two in cats, and one in sheep. M'Fadyean has never met with carcinoma in the pig. In the twenty-five cases in the horse, seven occurred on the penis (all geldings), four in the antrum, three on the tail, three in the stomach, and two in the urinary bladder. The rarity of carcinoma of the tongue, uterus, and mammary glands is remarkable. Two mammary adenocarcinomas occurred in the bitch, one in a mare. The immunity of the udder of the cow to carcinoma is difficult to harmonize with the theory that the "irritation" incident to lactation plays an etiological rôle in human carcinoma. In the case of the equine carcinomas, it is also noticeable that the tumors did not in any instance start in those parts of the body which are especially subject to irritation and friction. As regards age, the animals attacked were nearly always middle-aged or old.

Free Tumor Metastases in Serous Cavities. Beneke,[2] in a case of primary carcinoma of the stomach with secondary involvement of the liver and the lungs, found a number of cysticercus-like bodies floating free in the pleural effusion, and also in the blood and in the thrombi in the hepatic veins. These bodies varied in size from that of a grain of rice to a pea, and were composed of tumor cells. Some of the masses were more or less cystic, due to central necrosis. He also describes free masses of small round-celled sarcoma in the peritoneal cavity, and also of pigmented sarcoma in the pleural cavity. These observations show that the tumor cells have greater power of assimilation than physiological cells.

Warthin[3] describes a primary polymorphous-celled sarcoma of the nose with universal metastasis and the formation of a free sarcomatous mass as large as an English walnut in the right ventricular cavity. The free mass probably originated by the breaking loose of a polypoid metastatic nodule upon the endocardium and subsequent growth within the ventricle.

I remember an instance of colloid carcinoma of the peritoneum in which there were thousands of free intraperitoneal tumor masses, largely composed of colloid material. These, I think, however, were the result of detachment of preformed peritoneal nodules rather than of proliferation of free cells and cell groups.

Tumors of Extraordinary Size. Williams[4] has collected the records of tumors of the ovary, breast, and uterus of extraordinary size. The largest tumor mentioned is a cystic myoma of the uterus weighing 195 pounds, removed by Severanu, of Bucharest. There have been several myomas recorded of over 100 pounds in weight. The largest ovarian tumor, 169 pounds, was removed by Elizabeth Reifsnyder, of Shanghai, from a Chinese woman who without the tumor weighed only 77 pounds. It was a mononuclear cystoma containing eighty-eight quarts of fluid. The patient recovered. The largest mammary tumors result from so-called diffuse hypertrophy. Durston describes an instance in which the left breast weighed 64 pounds and the right 40 pounds. The late Professor J. B. Hamilton[1] successfully removed the hypertrophied breasts in the case of a woman, aged thirty-two years, the right breast weighing 27½ pounds and the left being of about the same size.

---

[1] Practitioner, April, 1899.

[2] Deutsche Archives für klinische Medecin, 1899, lxiv.

[3] New York Medical Journal, June 24, 1899.

[4] Lancet, September 23, 1899.

At the twenty-fifth meeting of the Mississippi Valley Medical Association (Chicago, October 3 to 6, 1899), James Bullitt read a paper on mammoth ovarian tumors, in which he reported a cyst of the enormous weight of 245 pounds, which appears to be the largest tumor on record. He refers to several other mammoth ovarian tumors which exceed in weight Reifsnyder's case.

Embryonal Adenosarcoma of the Kidney. The tumors of the kidney have long been a rich field for study. The modern tendency to distinguish between tumors according to the principles of histogenesis rather than on a purely morphological basis has led to important advances in our knowledge of the tumors of the kidney. First, Grawitz, in 1884, separated from the great mass of sarcomatous and carcinomatous tumors, with which it had previously been classed for purely morphological reasons, that important group of tumors which spring from a matrix of misplaced adrenal tissue, the adrenal tumors of the kidney, or as they are also called the hypernephromas. And now Birch-Hirschfeld[2] has gathered together in another histogenetic group the embryonal adenosarcomas of the kidney, tumors which heretofore have been called by various names according as variations in their morphology were emphasized. Within the short space of a few months a small literature has sprung up dealing with this new group of tumors of the kidney, and quite a number of cases have been described and interpreted from the new point of view.[3]

The group of tumors in question in the majority of cases develops in childhood. Their rapid growth, the resulting cachexia, and the formation of metastasis give them the characteristics of true malignant tumors. There has been much difficulty in correctly classifying these tumors, because they contain, in various admixtures, striped and unstriped muscular tissue, sarcomatous and other mesodermal elements, and imperfect or embryonal glandular formations. In the literature they have been described under the various names of carcinoma, adenocarcinoma, sarcocarcinoma, adenosarcoma, myosarcoma, carcinoma sarcomatosum, adenomyosarcoma, adenochondrosarcoma, adenosarcoma epitheliomateux, rhabdomyosarcoma, etc. Birch-Hirschfeld places them in a histogenetic group, refers their origin to the remains of fœtal organs or structures within the kidney, and designates the group as embryonal adenosarcomas, or embryonal glandular tumors of the kidney. There seems to be little doubt but that the growths in question constitute a natural group with clinical and pathological characteristics. While the adrenal tumors of the kidney occur mostly in adult life, the embryonal adenosarcomas develop mostly in childhood. In fact, authors have long emphasized the occurrence of renal carcinoma early in life, many being regarded as congenital in origin, and Weigert and others have described congenital renal tumors of this nature. Heineck has collected 138 malignant tumors of the kidney in early life, the second and third year showing the greatest number of tumors. Fifteen of these tumors were described as rhabdomyomas.

---

[1] Journal of American Medical Association, March 9, 1895.

[2] Centralblatt für Krankheiten der Harn- und Sexualorgane, 1894. Sarkomatöse Drüsengeschwulste der Nieren im Kindesalter, Ziegler's Beiträge, 1898, xxiv., 343.

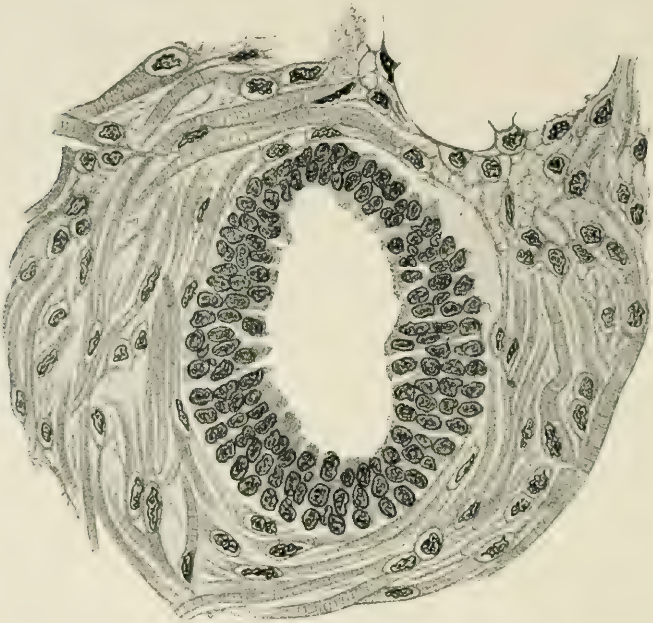
[3] Merkel, Beiträge zur Kenntniss der sog. embryonalen Drüsengeschwulste der Nieren, Ziegler's Beiträge, 1898, xxiv., 475. N. R. Muus, Ueber die embryonale Mischgeschwulste der Nieren, Virchow's Archiv, 1899, clv., 401. O. Busse, Ueber Bau, Entwickelung und Eintheilung der Nieren-Geschwulste, Virchow's Archiv, 1899, clvii., 346. Engelken, Ziegler's Beiträge, 1899, xxvi., 320.

The presence of muscular tissue in tumors of the kidney has long been a source of interest, so much so as to perhaps unduly monopolize the attention to the unjust exclusion of other and equally if not more important elements. Undoubtedly many cases diagnosed as simple sarcoma would prove themselves of this group if thoroughly examined. Muus refers to an instance of embryonal tumor in a patient thirty-four years old and to another at eighteen.

Clinically, these tumors pursue a rapid course, at least after the more pronounced symptoms have become apparent. In not a few cases metastases, naturally of the same structure as the mother tumor, develop, especially in the lungs and the liver. Occasionally nodules have formed upon the peritoneum (Engelken). The primary tumor is always intrarenal and appears to spring from the kidney itself. It may be more or less lobulated, and presents a variegated cut surface. Situated below the capsule of the kidney, it is itself provided with a capsule which may be perforated later in its course, and especially in those instances in which metastases form, which always appear to depend upon the perforation of some large vein and subsequent intravascular growth, often associated with thrombosis of the vena cava. As far as I have been able to note, metastases in the lymph-glands have not yet been described.

The histological structure of the embryonal glandular tumors of the kidney is said by nearly all the recent writers I have mentioned to greatly resemble that of the embryonal tissue of the kidney. All insist upon the evident embryonal character of the different kinds of cells and cell formations. These tumors are not by any means all of the same structure, nor is a single tumor likely to show the same structure in all parts. It is the general characteristics which show the identity of the different growths. Their general structure may be described as follows: Scattered throughout a sarcomatous or embryonal tissue containing more mature derivatives, such as striped muscular tissue (upon the presence of which much stress has been laid), smooth muscles, and, more rarely, cartilage, lie embryonal glandular or adenomatoid tubules, lined with loosely arranged cylindrical or polymorphous cells. The differentiation between the cells forming the glandular tubules and those in the periglandular stroma is not always well marked, and there may be more or less stroma among the gland cells. The imperfect glandular spaces are closed, irregular in outline and extent, and have no connection with the tubules of the normal kidney structure. The quite uniform absence of cysts in these tumors, except those of hemorrhagic origin, which occur mostly in the metastases, has been ex-

Fig. 31.



Embryonal adenosarcoma of kidney. Situated immediately upon the layers of striped muscular fibres are superimposed strata of cylindrical epithelium. (Busse.)

plained as due to the fact that the cells of the closed spaces have not yet reached that degree of development necessary for any kind of secretory or excretory function. Indeed, Engelken seems to assume that certain heaps of cells lying in the stroma form the matrix from which the connective tissue muscle fibres and epithelial cells all develop. I have not seen any statements concerning the condition of these cells as to glycogen. If glycogen were present in large quantity it would be further indication of their distinctively embryonal character.

The amount of striped muscular tissue varies. In some instances it seems to be wholly absent. In other cases, as, for instance, those described by Busse (Fig. 31), the cylindrical glandular cells were situated directly upon striped muscle fibres. In certain bilateral tumors of this kind striped muscle has been shown to be present in one tumor and absent in the other. The possibility that its presence might be overlooked is, of course, to be borne in mind. In some cases islands of cartilage and of mucoid and fat tissue were present.

Muus shows that in the surrounding capsule there may be uriniferous tubules.

Among the earlier theories of origin mentioned in connection with these tumors is Eberth's, by which they were traced to the Wolffian bodies. Busse points out that the hypothesis of misplacement of the Wolffian body is not at all demonstrated. The occurrence of aberrant adrenal remnants is very frequent, but not so with Wolffian remnants, which have not yet been described in the kidney. Kidneys of four to five months fœtuses show a remarkable structural analogy to embryonal adenosarcoma. At this time a sharp line cannot be drawn between the round cells in the stroma and embryonal epithelial cells, because the transition is so gradual. The assumption of Wolffian remnants would not explain the presence in these tumors of striped muscle fibres, which Busse holds originate from unstriped muscle by a process of metaplasia.

This question of transformation of smooth into striped muscles is an unsettled one. In favor of metaplasia may be mentioned various appearances which are best interpreted as transition forms. The occasional occurrence of striped fibres in places where smooth muscle usually occurs, as seen especially in certain sarcomas of the vaginal portions of the uterus and the wall of the vagina, and also in the wall of the pregnant uterus, is described by Girode and Nehrkorn, who both trace their development to metaplasia of smooth fibres. The fact that the position and the arrangement of the striped fibres in these abnormal places, as well as in embryonal tumors of the kidney, resemble those of smooth fibres. Finally, the occurrence in some animals of striped muscle in places where smooth muscle occurs in other animals would indicate that there is no fundamental difference between the two kinds of muscle.

For these and other reasons Busse holds that embryonal adenosarcoma comes from the kidney itself, that they reproduce the structure of the embryonal kidney in irregular form and arrangement, and that the striped muscle which may be present is derived from the smooth by metaplasia.

Endothelioma. The structure and histogenesis of the endothelial tumors continue to receive much attention. Franke,[1] Beck,[2] Pollmann,[3] each describe interesting examples of hæmangio-endothelioma. Franke's tumor developed in the external genitalia of a woman. The endothelial lining of the elsewhere normal vessels would suddenly begin proliferating, so that the lumen became plugged at the same time as the media and adventitia were infiltrated. Beck describes a similar form of endothelioma which originated in the interior of the humerus and grew to the size of a child's head. Here, also, the lumen of the vessels became filled with the proliferating endothelial cells at the same time that a similar infiltration took place in the extravascular tissue, but whether this was due to a diffuse growth of cells or to sprouting of new capillaries, as described by Borrmann, could not be determined. Glycogen was present in large quantities.

Pollmann describes an endothelioma of the pleura and of the peritoneum with an unusual extension into the bloodvessels, especially of the liver and the spleen, which gave him a good chance to study the relation of the tumor cells to the cells lining the vessels. The tumor cells proliferated as bands and tubules, the cells corresponding closely to the endothelium of the lymph-vessels and bloodvessels. When blood entered the spaces and tubules of the tumor its cells, especially those nearest the current, seemed to play the part of genuine endothelial cells. As the tumor cells spread they seemed to communicate a stimulus to the cells lining the spaces and vessels; the cells swelled up and came to resemble tumor cells very greatly, but it is of course doubtful whether they acquired all the characteristics of tumor cells. In the coexisting inflammation of the peritoneum the endothelial cells of the tumor appeared to undergo changes analogous to those of connective tissue cells proper under such conditions.

Borrmann,[4] who examined Most's case of capillary hæmangioendothelioma, could find no evidences whatsoever that the tumor cells exercised any sort of "contact infection" or stimulating influence upon the adjacent cells, to the possibility of which I have just referred, the tumor growing entirely by the multiplication of its own cells, which retain the power to arrange themselves after the manner of capillary endothelium.

---

[1] Virchow's Archiv, 1899, cliv., 363.

[2] Ziegler's Beiträge, 1899, xxv., 577.

[3] Ibid., 1899, xxvi., 37.

[4] Virchow's Archiv, 1899, clvii., 297.

The histology and histogenesis of the tumors of endothelial origin in the parotid gland receive a full consideration at the hands of A. O. J. Kelly.[1] Kelly shows that in American literature many of the tumors in this gland generally classed as sarcomas and carcinomas are undoubtedly of endothelial origin, inasmuch as they most frequently spring from the flattened cells lining the lymph-spaces, the glandular epithelium proper remaining wholly passive. The cells composing the tumors may be morphologically similar to the epithelial cells of ectodermal and endodermal origin, but, as would be expected on genetic grounds, the tumor cells in endothelioma preserve intimate relations to the surrounding connective tissue. In carcinoma the distinction between parenchymatous cells and the stroma always remains more pronounced. According as the lymph-spaces run between parallel bundles of fibrous tissue or between intertwining fibres the microscopical appearances may vary considerably; in the so-called mixed tumors of the parotid gland, in which islands of cartilage and of myxomatous tissue develop, hyaline material, due to obscure processes in the endothelial cells and in the stroma, frequently is produced.

Glioma. As pointed out by Flexner,[2] various types of tumors developing from the neuroglia can be referred to certain forms or stages in the development of the glia cells. The spider-celled glioma and the gliomas in which brush cells predominate represent the astrocytes as seen in embryonal life. Gliomas rich in fully differentiated fibres and in cells devoid of processes represent adult human neuroglia. Examples have been recently described by Ohlmacher[3] in cases of secondary epilepsy. Tumors composed of an intermediate cell form, such as the astroblasts, a less highly differentiated precursor of the glia cells than the ependyma cells, are also to be expected, and would present marked morphological resemblances to the small round-celled sarcoma. Finally, there are tumors made of cells of the type of the ependymal cells as seen in the spinal cord of the human embryo, and present throughout the whole life of certain animals. In these tumors the essential characteristic is the arrangement of the cells in a radial manner around the bloodvessels, toward which their protoplasmic prolongations are directed. Flexner points out the occurrence of such tumors in the cord in syringomyelia, and also that similar and other tumors of this class are found in the retina; and Wintersteiner has proposed the name neuroepithelioma retinae for those retinal tumors which contain rosettes of cylindrical cells

---

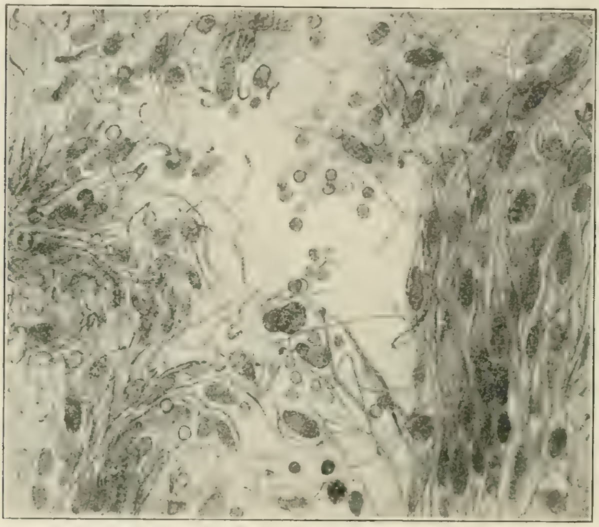
[1] Philadelphia Monthly Medical Journal, 1899, i., 61.

[2] Journal of Nervous and Mental Disease, 1898.

[3] Bulletin of the Ohio Hospital for Epileptics, 1898, Nos. 2 and 3.

—that is, correspond in structure to the ependymal-celled glioma. Ginsberg[1] claims that tumors of such cylindrical cells in the retina may be derived from misplaced cells of the pars ciliaris. These cells, he claims, are derived from the primitive cells of the retina at a period when as yet no differentiation into neuroblasts or spongioblasts has taken place. Hence he does not agree with Wintersteiner's theory that the tumors arise from neuroepithelium, and denies their homology with ependymal-celled glioma. Because the tumors are all of ectodermal origin, developing from cells prior to differentiation into neuroblasts, and because of certain clinical characteristics, Ginsberg suggests the name carcinoma retinæ.

FIG. 32.



This drawing is from a softened area into which hemorrhage has taken place. It shows fragments of fibres, naked nuclei, and free red blood-corpuscles. There are independent cells and fibres, probably due to a degenerative process. Stained after Van Gieson's method. (HUDSON, BARKER, and FLEXNER.)

In Hudson's case of syringomyelia, Flexner[2] shows that it concerns an ependymal-celled glioma with numerous cavities, some being preformed, others due to softening. The cells were polymorphous and surrounded by a fibrillated substance. There was noted the arrangement of the cells in the form of rosettes around the bloodvessels, which were quite numerous (Figs. 32 and 33). In this tumor Barker describes *degeneratio micans* (page 323.)

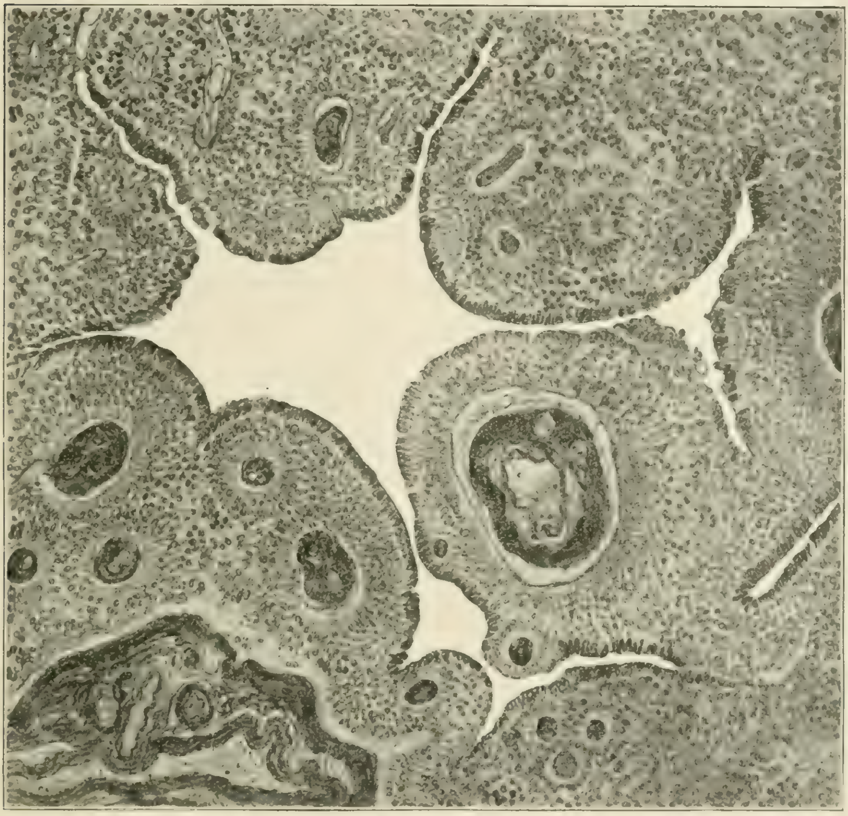
---

[1] Archiv für Ophthalmologie, 1899, xlviii., 22.

[2] American Journal of the Medical Sciences, 1899.

Herzog and Patrick[1] describe an ependymal-celled glioma of the brain, the arrangement of the cells in the form of perivascular rosettes being typical.

FIG. 33.



Projecting folds, resembling Grecian columns, covered with cylindrical epithelium, are shown. The folds are composed of rosettes of polyform cells, the similarity to ependymal cells being evident. Bloodvessels with much thickened walls and others with normal walls are present. The rosettes are developed about small bloodvessels. Stained in hæmatoxylin and eosin. (HUDSON, BARKER, and FLEXNER.)

Freudweiler[2] describes an absolutely unique example of multiple gliomas in the spinal cord. The cord was obtained from the body of a man, aged twenty-six years, who died from traumatic tetanus. The tumors were circumscribed and small, occurring more numerously in the gray than in the white substance, but in neither case could any genetic relation be shown to exist between the tumors and the ependymal lining of the central canal. Many of the nodules presented more or less extensive softening and cavity formation. The tumors were composed of adult neuroglial tissue, with but few cells, and are to be regarded as primarily multiple, resembling in this respect multiple fibromas in the skin.

---

[1] Transactions of Chicago Pathological Society, 1899, iii.

[2] Virchow's Archiv, 1899, clviii., 64.

Storch[1] notes the frequent occurrence of tumors in the spinal cord in the same place as traumatic hemorrhages, especially along the entrance of nerve-roots. He also mentions the liability to polymorphism of the cells in gliomas, that ependymal cells may give rise to gliomas in the adult, and that diverticula and misplacements of the central canal and irregularities of various kinds in its lining—slight degrees of which are very frequent—favor their development. The radiating arrangement of glia fibres around the vessels in these tumors and the tendency to the formation of tubules are characteristic, and are observed in the retina (Wintersteiner) and the cord. Storch also refers to the peculiar degeneration in ependymal gliomas which has been described by Rosenthal and Barker, and named by the latter *degeneratio micans* (p. 323). The radial arrangement of glia cells and fibres about the bloodvessels is regarded as favoring the capillary flow of lymph.

PARASITIC WORMS AND OTHER PARASITES.

Nuttall[2] refers to "The Poisons Given off by Parasitic Worms in Man and Animals." Some of the older writers (Huber, Friedreich) believed that intestinal parasites produced evil effects by poisons given off from their bodies. Nuttall alludes to the article by Peiper, of Griefswald, who has collected together a great deal of evidence which clearly proves that a number of worms do give off poisons. In the case of the round-worms (ascarides) the evidence is striking. In Bastian's case, examination of the live worms brought on catarrhal symptoms which lasted six weeks. Miram, while studying the A. megalocephala, was attacked by sneezing, lachrymation, and swelling of the fingers which had been in contact with the worms. Von Linstow accidentally touching his eye developed a severe keratitis and consecutive chemosis. Lussan and Loos claim that the ankylostoma duodenale also contains a poison.

Trematoda. Sandwith,[3] of Cairo, mentions a case of distomum heterophyes found in a living patient, a girl, fifteen years old. This adds another to the scanty list of cases of this parasite first observed by Bilharz over half a century ago (1843).

---

[1] Virchow's Archiv, 1899, clvii., 127.

[2] American Naturalist, 1899, N. S., vol. ii.

[3] Lancet, 1899, ii., 888.

While Bilharzia hæmatobia is exceedingly common in the urinary tract and rectum of the Egyptian natives, primary infection of the vagina is rare, yet Madden[1] reports a case in a young married woman, which was removed by operation. This author also reports two cases,[2] one in a boy of ten years and the other in an old man, where large masses of tissue were removed from the rectum, with considerable improvement. Childe[3] corroborates the view that infection with Bilharzia takes place during bathing. He narrates the case of a young white girl of sixteen years, who was accustomed to bathing in a fresh-water pool in South Africa, and was subsequently affected.

Cestoda. TÆNIA SOLIUM. Diamond,[4] in a communication from the Pathological Laboratory of Rush Medical College, gives the details of a case of cysticercus of the brain and cord. The condition is exceedingly rare in America (nine cases reported). The patient was a woman, aged thirty-four years, who had convulsions at intervals of one-half hour for three days before death. Cysts were found scattered over the outer surface and also in the interior of the brain. In the cord they were more abundant in the dorsal and lumbar regions. The patient had a history of convulsions, beginning at sixteen, four years before she came to America, so the infection was of long-standing and evidently acquired abroad. Goodliffe[5] describes a somewhat similar case. An epileptic dement died after five years' stay in an asylum. Numerous cysts were found in the brain and on its surface, also in the heart and in the subcutaneous tissues throughout the body. Unlike Diamond's case, the cysts in the brain were all soft, with no calcareous deposits.

Passelt[6] relates a case of general cysticercus, and believes it due to an auto-infection. The patient had been in the habit of eating raw pork, and had passed segments. A man of twenty-five years had Jacksonian epilepsy; numerous cysts were found in the muscles and subcutaneously. The cysts are more common in the upper part of the body, and, as shown by Loeb and others, are symmetrically distributed.

TÆNIA ECHINOCOCCUS. Cysts in unusual locations have been reported by Chrobak[7] (pelvic areolar tissue), Reich[8] (throat), in a seventy-year-old Kaffir, and Thomson[9] (axilla), in a little girl aged two years, first noticed at six weeks; Blaschek[1] (eye), fifty-nine cases since 1774; two cases have been met with in Fuchs' clinic in eight years (142,425 cases). Subbotic,[2] pancreas or mesocolon (impossible to tell which, on account of inflammation), also one in vermiform appendix. Boinet and Chazovlière[3] claim to have extracted a highly toxic ptomaïne from the liquid obtained by aspiration.

---

[1] Lancet, 1899, ii., 1716.

[2] Practitioner, 1899, lxii.

[3] British Medical Journal, 1899, Nos. 2019.

[4] Journal of American Medical Association, 1899, xxxii.

[5] Lancet, 1899, i. p. 1282.

[6] Wiener klinische Wochenschrift, 1899.

[7] Centralblatt für Gynäkologie, 1899, xxiii.

[8] Münchener medicinische Wochenschrift, 1899, xlv., 2, p. 1561.

[9] Lancet, 1899, i., 25.

TÆNIA NANA. H. Roder[4] discovered the eggs in the stools from a little girl. A cure resulted, although the worm itself was not seen. This is the second case reported from Germany; the first occurred in Cologne, and it seems worthy of note that the second patient had lived there for a time.

Nemathelminthes. OXYURIS VERMICULARIS. E. M. Simons[5] found two specimens of this worm in the uterus of a woman of forty-two years suffering from endometritis and laceration. (Another confirmation of their migratory habits.)

ANKYLOSTOMUM DUODENALE. Leichtenstern,[6] in his article "Zur Ankylostoma Anämie," shows how frequently anchylostomum occurs in inhabitants of tropical countries. The greater the number present, the greater the danger, and if several hundred are present no race has any immunity. C. H. Tebault, Jr., of New Orleans, reports a case in a boy of fifteen years, who has always lived in that city. The attack had existed for eighteen months. A rapid cure resulted after treatment.

TRICOCEPHALUS DISPAR. Powell[7] writes: "It is exceedingly common in this district" (Cachar). In thirty-seven consecutive necropsies he found the worm in thirty-three cases. He confirms Leuckart's observation, that the neck of the worm transfixes the mucosa like a pin.

TRICHINA SPIRALIS. Osler[8] points out that extensive outbreaks are easily diagnosticated, but a large number of sporadic cases are overlooked. He gives records of five cases seen within two years and a half, and in each one pronounced eosinophilia was present, with marked leucocytosis. He believes this is an important diagnostic point. In this he is corroborated by Brown.[9] Fischer,[10] of Berlin, records a case in which he believes simultaneous infection with typhoid fever and trichina occurred from eating raw pork. Osler[11] states that trichinosis bears a close similarity to typhoid.

---

[1] Wiener klinische Wochenschrift, 1899, xii., 126.

[2] Ibid., 654.

[3] Revue de Médecine.

[4] Munchener medicinische Wochenschrift, 1899, xlvi., p. 344.

[5] Centralblatt für Gynäkologie, 1899, xxiii., 777.

[6] Deutsche medicinische Wochenschrift, 1899, xxv., 1, p. 41.

[7] Indian Medical Gazette, 1898, xxxiii. p. 441.

[8] American Journal of the Medical Sciences, 1899, cxvii.

[9] Medical News, 1899, lxxiv. p. 12.

[10] Deutsche medicinische Wochenschrift, 1898, xxiv. p. 281.

[11] Loc. cit.

FILARIA (DRACUNCULUS) MEDINENSIS. Harrington[1] believes that this parasite is introduced not through the drinking-water but through the skin in water-carriers and others who wade in the mud. In support of his views he cites 200 cases, in 75 to 80 per cent. of which the parasite was found in the lower extremities, chiefly below the knee; the other 20 to 25 per cent. were, in order of frequence, back, waist, upper extremity, head, neck, and groin.

FILARIA PERSTANS OF WEST AFRICA[2] proves to be the same species as the blunt-tailed filaria described by Daniells, from British Guiana. Hence the parasite is endemic in tropical America as well as in tropical (West) Africa.

Arthropoda. PENTASTOMUM CONSTRICTUM. Chalmers[3] gives details of a negro man affected by this rare parasite. On opening the abdomen large numbers of pentastoma were seen moving about and attached. The liver contained a large number, but there were none in the biliary apparatus, stomach, duodenum, or large intestine; many were present in the jejunum, ileum, and lungs. Chalmers believes entrance is gained through the alimentary canal and the trachea. It apparently occurs only in negroes.

ACARUS FOLLICULORUM. K. Joers[4] denies that there is any relation between this parasite and blepharitis. As proof he shows that it was found in 64 per cent. of healthy lids without any symptoms arising from its presence.

ŒSTRUS HOMINIS. Herzog[5] met with a single larva extracted alive from the skin on the abdomen of a four-year-old girl.

---

[1] British Medical Journal, 1899, No. 1986, p. 146.

[2] Ibid., No. 1990, p. 429.

[3] Lancet, 1899, i. pp. 1715, 1729.

[4] Deutsche medicinische Wochenschrift, 1899, xxv., 1, p. 220.

[5] Medical News, 1898, lxxiv. p. 268.

LARYNGOLOGY AND RHINOLOGY.

By A. LOGAN TURNER, M.D.

GENERAL SYSTEMIC INFECTION OF NASAL ORIGIN.

The subject suggested by the above title is in no sense a new one, but it is one of very considerable practical importance, and recently the attention of the profession has again been drawn to it. Some years ago Carter,[1] of Liverpool, published a series of interesting cases of fever of a hectic type, in which the origin of the malady remained for a long time obscure. Great difficulty was experienced in determining the source of the septic infection, and a careful examination of all the organs gave negative results; only when attention was directed to the nose was the exact state of affairs explained. The similarity of the symptoms to those of ague, and sometimes to typhoid fever, adds additional interest to their study. In one of the cases reported by Carter the following points may be noted. The patient, a medical man living in a healthy seaside town under most favorable conditions, suffered daily from rigors, which recurred with all the regularity of attacks of ague. Although suffering from considerable discomfort and often with a temperature of 103° F., he continued his professional work. The possibility of tuberculosis preyed upon his mind, but a most careful examination of the lungs excluded the presence of any pulmonary condition; the heart and all the other organs were found healthy. The only sign, indeed, which suggested the possible existence of any lesion was the expectoration of a little mucus every morning, and an examination of the nose revealed the presence of a catarrhal condition of the left nostril. Irrigation of the nostril and gargling with liquor sodæ chlorinatæ, followed by insufflation of boric acid powder into the nose, were ordered. The improvement in the patient's general condition was marked, and took place at once after the commencement of the treatment. The fever and rigors ceased and did not again recur. In another case the symptoms from which the patient suffered suggested the existence of typhoid fever, but all the internal organs were perfectly healthy. A rhinoscopic examination finally revealed the presence of necrosed bone in the posterior nares.

---

[1] Lancet, October 19, 1895.

More than one operation was performed, with temporary benefit, but recurrences took place until more radical measures were resorted to, with complete cessation of all symptoms.

I have briefly referred to these two cases of general septic infection resulting from an almost insignificant nasal lesion because they are illustrative of a type of illness which may present very serious symptoms and simulate a grave affection. Both the patients were medical men, and yet neither of them had reason to suspect the existence of any nasal lesion. In that type of case the diagnosis becomes all the more difficult. In others, again, similar constitutional symptoms may arise, but with a more pronounced pathological condition in the nose.

A case of fetid atrophic rhinitis with general systemic infection is related by Permewan,[1] of Liverpool. Symptoms of general malaise and loss of appetite were complained of; the daily temperature was always 100° F., rising in the evening to 102° and 103° F., while the pulse ran from 100 to 110 per minute. No possible source of blood-poisoning could be elicited, but finally the patient acknowledged that for twenty years his nose had given him considerable trouble, necessitating the frequent use of numerous handkerchiefs. There were intervals when he believed himself to be perfectly well, but recurrences sooner or later took place. Examination of the nose revealed the presence of numerous offensive crusts in the nose and nasopharynx. These were removed and the cavities brushed out with iodine and glycerin and irrigated several times daily with antiseptic solution. The result of this treatment was eminently satisfactory; the temperature fell within twenty-four hours and did not again rise, and at the end of three weeks of careful local treatment the patient's general condition was excellent.

No one can gainsay the practical interest which lies in these cases, and they strongly suggest the necessity of a more frequent examination of the nose in cases of doubtful origin. It is possible also that a more regular use of the thermometer might reveal a more frequent occurrence of general disturbance due to septic causes in the nose. A patient who recently came under my care, suffering from fetid atrophic rhinitis with associated accessory cavity disease, frequently used a clinical thermometer of his own. On several occasions he reported rigors, with the temperature rising to 103° and even to 104° F., with periods of general malaise. There was no reason to suspect the authenticity of the statements thus made, and on two occasions when the patient remained in the hospital under treatment similar rigors were observed. The possibility of tuberculosis and of malaria was discussed, but both were excluded. The interesting point in the case, and one which supports the statements made by Carter in his paper, was this, that if irrigation of the nose was not carried out in the morning, but delayed until after midday, a rigor was frequently noticed.

---

[1] Liverpool Medico-Chirurgical Journal, July, 1899.

OZÆNA.

Last year the subject of ozæna was very fully discussed,[1] not only in its pathological bearing, but from the point of view of therapeutics. It is not my intention, therefore, to again deal with this affection in the same comprehensive way, but rather to submit to the reader one or two additional points of practical utility more or less confirmatory of the statements previously made. The subject is one which must always command the interest of the profession, and is one for which a successful and permanent cure is still sought, hence the results obtained by treatment should be carefully studied.

Treatment. CUPRIC ELECTROLYSIS. McBride,[2] of Edinburgh, has published his first series of cases treated by this method; the detailed account of each patient's condition and the conclusions drawn from them by this authority provide interesting reading. Although a large number of patients were treated by electrolysis, only eight are reported. These were not selected for publication on account of the favorable results obtained, but they are recorded because it was only possible to keep a record of a certain number. Again, as so frequently happens, patients are lost sight of, thus making further examination impossible.

The strength of the current employed McBride varied from 3 to 10 milliampères; the duration of the sitting was usually ten minutes. As a rule it was only necessary to apply the needles to one nostril, although the affection was bilateral; sometimes at a second sitting they were introduced into the opposite nostril, but it was interesting to observe the beneficial effect upon both sides when the application was limited to one nostril. In every case the séance was carried out under cocaine after the nasal fossæ had been cleared of the crusts. A fine copper needle, carefully insulated with the exception of a small area at its point about one-third of an inch long, after being attached to the positive pole of the battery, was inserted under the mucous membrane of the inferior or middle turbinated body. The negative platinum or steel needle was inserted under the mucosa of the septum. As a rule the patients did not complain of pain during the operation, nor did they experience any disagreeable after-effects. The number of sittings in each case varied, as did the interval also between each séance. Improvement invariably commenced immediately after the electrolysis—that is to say, when the patients reported themselves, two or three days later, definite amelioration in the symptoms was observed. Sometimes a second sitting was deemed necessary a fortnight or a month later; in one patient the operation was performed six times—the maximum number in any given instance. The amelioration consisted in a disappearance of the fetor and in a liquefaction of the secretion, with a consequent diminution in the crusting. Owing to the general state of moisture in the nose, any crusts which formed came away readily, and, with the disappearance of the crusts, the odor diminished and in some cases was no longer perceptible. Of the eight patients, four were practically cured for long periods, extending to eighteen months; in one there was marked improvement; in one there was apparent cure for some months, and then syringing had to be resumed; while in two there was improvement for only a few weeks. This fact must not be forgotten, however, namely, that where patients are treated by this method, syringing can, as a rule, be discontinued. By the term cure is meant the disappearance of the fetor, and not any fresh growth of the nasal mucosa, the atrophy remaining as before. To quote McBride's own words: "In cupric electrolysis we have a valuable therapeutic resource, probably the most valuable that has yet been suggested for ozæna."

---

[1] PROGRESSIVE MEDICINE, March, 1899, Vol. I.

[2] Edinburgh Medical Journal, March, 1899.

THE SERUM TREATMENT. The use of antidiphtheritic serum, first introduced by Belfanti and Della Vedova, has not been entirely given up, but the comparative rarity with which reference is made to it in recent literature indicates that the same attention is not now being paid to it. Frankenberger[1] has used it in three cases of ozæna. In one, thirty injections were made during a period of four months, comprising altogether the use of 26,600 units. The formation of crusts was not prevented, but only diminished, and those that were formed did not give rise to any fetor; the mucous membrane appeared redder and more turgescent. This improvement was still observed two and a half months after the cessation of treatment. In the second case eighteen injections were administered during a period of two months, and the same improvement was noted. Five months after the cessation of treatment there was neither odor nor crusts, and the mucosa presented a normal appearance. To such a result the term cured might be legitimately applied. The third case remained under treatment at the time of writing.

The interesting point in this paper lies in the following experiment: A fourth patient received injections of saline solution, and exactly analogous results were obtained as with the use of the antidiphtheritic serum. Fifteen injections of the saline were given. Such a result is on similar lines to those obtained by Mygind, and supports the view which has been advanced by some, that the action of the antidiphtheritic serum, as used by Belfanti and Della Vedova, is not antiparasitic, but produces a stimulating action upon the nasal mucosa; this causes an increased flow in the secretion, with diminution in the number of the crusts and consequent disappearance of the odor. The action of the electrolysis is probably of a similar nature, and is stimulating and not germicidal. In support of this we have the following facts: That a copper needle is not essential, the substitution of a silver one producing favorable results; that the application of the electrolysis to one nostril gives equal improvement in the other, and that the so-called organisms of ozæna are still found in cases which are treated and benefited by electrolysis.

---

[1] Klinische therapeutische Wochenschrift, 1898, Nos. 39 and 40.

THE USE OF FORMALIN IN OZÆNA. As the application of electrolysis to the nose demands the use of appliances not readily accessible to all, it is necessary to seek for some agent which may both give valuable results and be readily procurable. It would have been surprising had formalin not found some application in the treatment of fetid atrophic rhinitis. It is a powerful antiseptic and deodorizer, but it is also an irritant, and on that account some care must be exercised in its use.

Bronner,[1] of Bradford, has found formalin a useful remedy in ozæna. Before its application the nares should be thoroughly cleansed with an alkaline or mild antiseptic lotion. As the cleansing is a mechanical process, considerable quantities of the lotion should be syringed through, this being best effected by the use of a Higginson's enema syringe. After this has been thoroughly done formalin is used. The method adopted by Bronner is on the following lines, viz., to inject into the nose a solution of liquid formalin, 1 part in 1000 or in 2000 of water, from a small nasal syringe. If used as a spray he advocates a solution of 1 in 500 or 1 in 1000, with a little glycerin added; this is applied three or four times daily for a few days and then for two or three days each week for a few weeks or months. If any pain is produced by the application, and this is possible, further dilution is necessary.

Before concluding this brief note on treatment it is necessary to make some reference to the question of associated sinus affection in cases of ozæna. If such an association exists the indications for treatment are at once established. The relative frequency of this occurrence is still a matter of dispute. That ozæna and sinusitis may coexist, no one denies; but that the latter always bears a direct causal relation to the former cannot be accepted. In all cases of ozæna it is advisable to consider the possibility of the coexistence of accessory sinus mischief before commencing treatment, and take such steps as may be deemed necessary for establishing the diagnosis. Jacques[1], of Nancy, has recently attempted to argue against the existence of ozæna as a definite pathological entity. He considers such a view to be a seductive hypothesis. The most frequent cause of fetid atrophic rhinitis is to be found, according to that author, in a chronic empyema of one or more of the accessory cavities. In proof of this he goes on to say that out of 114 cases of ozæna, 32, or more than one-fourth, were associated with accessory cavity mischief. Other authors also bring proof of such facts, and if the means of exploring the posterior ethmoidal and sphenoidal sinuses were as satisfactory as those in connection with the fronto-maxillary system the coincidence would be found to be still more frequently the rule. According to Bresgen there is often a posterior sinus affection, and of eleven cases of ozæna ten had associated sphenoidal suppuration, usually bilateral. The whole question has been fully discussed by George,[2] a pupil of Jacques, in a recent thesis. It is possible, of course, that the sinus affection may be secondary and not the primary cause. The practical outcome of the question, however, remains unchanged. While a large number of cases of ozæna are free from any such complication, there are undoubtedly others of which this cannot be said. In each case a correct diagnosis must, if possible, be made, and the treatment must be carried out along the lines thus indicated.

---

[1] Journal of Laryngology, London, October, 1899.

THE TREATMENT OF DEFLECTION OF THE NASAL SEPTUM.

If the nasal septum be defined as anatomically correct when it forms a straight partition between the two fossæ and is free from any outgrowth, then a normal nasal septum is of very rare occurrence. Slight deviations of the septum and thickenings or outgrowths from it are so frequently met with that they may justly be said to constitute the normal state of affairs in that region. Such deviations and thickenings can only come to be considered as pathological when they interfere with the proper function of the nose either as a respiratory or as an olfactory organ. The existence of a normal nose, therefore, should be considered rather from a physiological than from an anatomical stand-point. Deformities of the septum as a cause of nasal obstruction have for many years received considerable attention at the hands of rhinologists, and various operations have been devised for their rectification. Treatment may be necessary to straighten a deflection or deviation, to remove a thickening or an outgrowth from the septum, or to correct both of these conditions. The failure to effect a permanent straightening of the septum in so many cases formerly operated upon has been due to the natural resiliency of the cartilage. It must be borne in mind that the deflected cartilage is larger than a straight one. If an attempt be made merely to replace it in the middle plane of the nose it is equivalent to placing it in a position which is vertically too small for it, and consequently it will not remain there, for the natural tendency of the resilient cartilage will be to slip back into its former position. The more recent operations have been planned to deal with this aspect of the case.

---

[1] Revue hebdomadaire de Laryngologie, Bordeaux, August 19, 1899.

[2] Ibid., October 21, 1899.

The foregoing remarks have been made with the object of leading up to the consideration of a discussion upon the "Treatment of Nasal Stenosis due to Deflective Septa, with or without Thickening of the Convex Side," debated by the Section of Laryngology of the New York Academy of Medicine.[1] To American workers in this field we owe much, and it is interesting to study their views of the subject at this date. A brief review of the question as presented there may be given here. Bosworth, in introducing the discussion, reiterates what he has said on previous occasions with regard to the use of the saw for the removal of projecting portions of a deflected septum. During the twelve years which have elapsed since he first advocated its use nothing has occurred to alter his opinion as to its value, so he continues to do what is necessary with equally favorable results. Bosworth was followed by Morris Asch, of New York; but as I fully described his method of operating last year[2] it is unnecessary to repeat it now. It is sufficient to state merely that the principle of the operation rests upon the destruction of the resiliency of the cartilaginous septum by fracturing it along certain lines before replacing it in the middle plane; the broken fragments override each other, and adhesions form between them. Since the report by Mayer, in 1898, of 200 cases thus operated upon, 139 further cases have been observed by Asch, and in all of them the results were satisfactory, inasmuch as the respiratory function of the nose was restored.

Roe, of Rochester, laid considerable stress upon this point, namely, that while steps are taken by the majority of operators to overcome the resiliency of the cartilage, nearly all fail to take into consideration the deflection of the anterior part of the osseous septum, with which, he considers, the deviation of the cartilaginous portion is almost invariably associated. With regard to this statement there will be a difference of opinion among operators. This association is met with, according to Roe, in nearly every case. In order to overcome this difficulty and change the direction of the osseous septum, he fractures the bone at the osteocartilaginous junction with a pair of specially devised forceps, and then brings the septum into the mesial line. The elasticity of the ante-

[1] Laryngoscope, St. Louis, June, 1899.

[2] Progressive Medicine, March, 1899, Vol. I.

rior part of the cartilage is overcome by a vertical and horizontal bevelled incision made through the most curved part of the septum. The obliquity of the cut edges of these incisions permits the surfaces to slide past each other and so diminishes the vertical height of the septum. Along both the lower and upper borders of the deflection an additional incision may be found necessary, sufficiently deep to detach the cartilage, and, if possible, without dividing the mucous membrane on the concave side. After the septum has been thus cut and straightened a piece of flat metal wrapped in lint is inserted into the nostril on the convex side, care being taken that the plug is not of such a size as to force the septum across into the opposite nostril. At the end of three or four days this is removed, the nostril is again thoroughly irrigated and rendered aseptic, and then a smaller plug is inserted for two days. If any spurs or ridges are found on the septum they should be removed prior to the operation just described.

The method adopted by Watson, of Philadelphia, advocated during the discussion, aimed at destruction of the resiliency of the cartilage in the following way. Two angles of deflection may be present: one horizontal, running from before backward, and usually low down, and another, perpendicular, near the front of the septum. One incision is made through the septum from the convex side, just below the horizontal angle, commencing behind at the bone and running directly forward; this incision is bevelled from below upward. Should an anterior perpendicular angle exist, a bevelled vertical incision is also made just in front of the angle, meeting the first inferiorly. The upper part of the septum is then pushed over by the finger into the opposite nostril, the lower edge of the upper fragment gliding over the lower fragment and hooking on to the opposite side of the base of the septum. A strong, pointed tenotome is used for the purpose of cutting, and if hard bone be encountered the upward cutting saw may also be employed. If the deflection extends backward into the osseous septum, Adams' septal forceps are used in order to break up the bone and mould it into line.

Gleason had obtained successful results by cutting a U-shaped flap in the septum and forcing it through the hole thus made into the opposite nostril. Under cocaine a thin saw is introduced along the floor of the nose beneath the deviation and a horizontal cut is made by it into the septal tissues. After proceeding to a considerable depth the direction of the saw is rapidly changed so that the subsequent sawing is made nearly vertically upward exactly parallel to the septum. Care must be taken that the point of the saw passes beyond the bulging portion, so that the cut is made around and not through any part of the deviation. The U-shaped flap thus cut is now thrust with the fingers through the hole, its neck above being then sharply bent. A tube is passed into the nostril upon what was the convex side, and is left there for twenty-four hours. The author advocates this operation on the ground of its simplicity, from the rapidity with which it can be carried out, and because it entails a minimum amount of suffering.

Douglas, of New York, operates under ether and uses two knives, with their short blades set at right angles with the shaft. Having ascertained the lines of deflection by digital examination he introduces the sharp spear knife into the obstructed nostril while the little finger of the left hand is passed into the free nostril, where it readily determines the position of the point of the knife through the thickness of the septum. At the point of greatest convexity the knife is pressed through the septum, buttonholing it, the accuracy of the puncture being gauged by the finger in the other nostril. After a small incision has been made the second or blunt-pointed knife is introduced into the cut, and with the finger still as a guide, this knife is drawn forward or backward along the ridge of the convexity until it reaches a point which is not deflected; as a rule, this incision must extend from the bone behind to the vestibule in front. If any other deflections are felt joining the main one they also must be incised throughout their whole length. If the bony ridge of the superior maxilla is displaced it must be broken free from its attachment with strong-bladed forceps, and any adhesions which may exist between the cartilage and the mucous membrane must also be destroyed by forcibly twisting the septum with the forceps. The septum thus thoroughly incised and freed is bent away from the obstructed side; an overlapping of the cut edges is thus produced toward the concavity by introducing the finger into the obstructed nostril. Should the osseous septum also be deflected it must be broken with the forceps. A splint is introduced into each nostril, and should not be removed for forty-eight hours unless there is much pain and swelling.

ASTHMA AND NASAL DISEASE.

The wide-spread interest attached to this subject has recently been evidenced in the fact that both the Laryngological Society of London[1] and the American Laryngological Association[2] deemed it a matter worthy of discussion among their members during the past year. A comparison of the views held by specialists on both sides of the Atlantic must undoubtedly prove of interest. While the exact pathology of the asthmatic attack is still somewhat uncertain, the general view held in regard to bronchial asthma is that it is a neurosis. In discussing the relation of nasal disease to asthma, the existence of the constitutional element must not be lost sight of, otherwise erroneous opinions may be expressed as to the ultimate result of treatment applied to the nose. It is also known that such nasal symptoms as sneezing, hypersecretion, and obstruction to respiration are frequently met with in connection with asthma, and an examination of the nose in these cases may reveal the existence there of certain morbid conditions. From such an association it has been assumed by some that asthma is a reflex result of the nasal lesion, and the hay fever cases which alternate with asthma support this nasal reflex view. It must be borne in mind, however, that the irritating pollen particles can reach the bronchioles as well as the nose, and may, therefore, act directly as irritants upon the tubes. Additional proof is found in this fact, too, that a marked improvement results in some cases from the removal of certain nasal abnormalities, still further suggesting that the nasal lesion may be the cause of the attack. The changes that may be met with in the nose in asthmatics may be of the nature of polypi or such obstructive deformities as spurs and deviations of the septum; hypertrophic rhinitis and œdematous swellings of the lining membrane of the middle turbinated may be recognized. All these conditions may be found in persons who have no asthma and who have never suffered from symptoms at all suggestive of it. When hypertrophic rhinitis, œdematous mucous membranes, and even polypi exist in association with asthma the question arises as to how far they may be the consequence rather than the cause of the bronchial paroxysms. In some cases there is no evidence of the existence of any of these lesions until after the asthmatic attacks have recurred for years.

---

[1] Transactions of London Laryngological Society, June, 1899.

[2] New York Medical Record, June, 1899.

The question was discussed in London both by the general practitioner and by the specialist; the conclusions arrived at by Dr. Percy Kidd, who voiced the medical side of the question, may be summarized in this way: In some cases asthma is relieved by the removal of polypi, though the explanation of this effect is somewhat obscure; the prospects of improvement, however, in the case of polypi are very uncertain, but if definite nasal stenosis exists, local treatment is not only warranted, but advisable. At the same time the uncertainty of the result must be clearly explained beforehand to the patient. Evidence of the importance of the neurosal element in asthma was seen, first, in cases of ordinary asthma where nasal symptoms existed, although the nose contained no polypi and appeared otherwise healthy; secondly, in cases of hay asthma where spasmodic attacks persisted during the winter independently of the external excitant and quite apart from the existence of peripheral irritation of the nares.

An able exposition of the subject from the point of view of the rhinologist was given by Dr. McBride. Dealing first with hay fever, he considered it as the commonest form of nasal asthma; in some of these cases there were found more or less marked abnormalities in the nasal passages, but in a large number of instances the parts, except during the attacks, were for all practical purposes normal. A relatively common form of nasal asthma was that associated with polypi frequently small in size and not completely occluding the nostrils. I shall refer to this point again. Where such polypi exist McBride believes that there is a reasonable expectation of benefiting the patient by their removal. Again, in certain cases of hypertrophic catarrh and deviations of or outgrowths from the septum, concomitant asthma may be relieved by operative interference. Dr. McBride next referred to a fourth and important class of asthmatics, in which nasal treatment appeared permissible and even desirable, although the existing conditions in the nose were such as not to indicate operation under other circumstances—*i. e.*, in non-asthmatics. Thus, if an attack of bronchial asthma be preceded by sneezing and hypersecretion, the application of the electric cautery may be beneficial, possibly by destroying the nerve-endings through which the reflex vasomotor changes are produced. The formation of cicatrices, too, by binding down the erectile tissue, may prevent swelling and obstruction. The speaker then touched upon an important clinical phenomenon, and one which he has repeatedly called attention to in this connection—*i. e.*, to the existence of cough spots upon the nasal mucosa. In his experience it was not so very uncommon to find in asthmatic patients that the touching of certain areas within the nose by a probe produced a reflex cough. These areas might be met with on any part of the mucous membrane, but were most commonly situated upon the inferior turbinated body. The application of the electric cautery to these sensitive spots produced marked amelioration of the asthma. Reference was next made to what we might fitly describe as a fifth class of cases, namely, the occurrence of asthma in patients whose nostrils are normal. Is it possible to benefit asthma by applying the cautery to a normal nose? To this question Dr. McBride was inclined to reply that its application, acting as a counter-irritant, might have a beneficial influence upon the paroxysms of asthma. In considering the question of the prognosis of nasal asthma he would never promise the patient a cure, because the nose is rarely, if ever, the only cause of asthma. Much good, however, may be done by the removal of such growths as polypi and by cauterizing the cough areas already alluded to.

The opinions just summarized certainly expressed the feeling of the majority of the meeting, though it was not a unanimous finding, more than one member expressing the view that only in a minority of the cases was asthma amenable to intranasal treatment. With regard to the difficulty of obtaining permanent cure, as opposed to temporary improvement or amelioration of symptoms, there was a more pronounced opinion.

Sir Felix Semon divided asthmatic patients into three classes: 1. Where lasting success was obtained from intranasal treatment—an exceedingly small percentage. 2. Where there was temporary benefit—a comparatively large percentage. 3. Where there was no success at all—a very large percentage. He considered that it was impossible to say beforehand, as the result of examination, into which of these three groups an individual patient could be placed, and, therefore, treatment in all such cases was more or less of the nature of an experiment.

So far we have dealt with asthma and its relation to intranasal lesions but the discussion did not limit itself to this side of the subject alone. Has asthma any relation to post-nasal conditions or conditions existing in other parts of the upper respiratory tract? Referring to McBride's remarks in dealing with this point, we find the opinion expressed by him that it is rare to find this neurosis produced by lesions of other parts of the upper respiratory tract. On only one occasion had he found asthma apparently cured by the removal of adenoids from a young boy. On the other hand, Herbert Tilley, whose experience of the surgical treatment of nasal asthma had not been satisfactory, considered that he had really cured asthma in those children where the disease was associated with adenoids, large tonsils, and bronchial catarrh—a view concurred in by others. It is possible that in some of these cases the difficulty of breathing was not of a genuine asthmatic nature, but due rather to the natural difficulty experienced by obstruction of the nose.

I have referred to the existence in asthmatics of small polypi which did not completely fill the nasal fossa or cause obstruction. A suggestive paper by Meyjes,[1] of Copenhagen, on the "Etiology of Some Nasal Reflex Neuroses," has an interesting bearing on this point. He had been impressed by the fact that after the removal of nasal polypi in his asthmatic patients the paroxysms ceased, although the nasal cavity was plugged with wool so as still further to impair respiration. The introduction of the plug to stop hemorrhage prevented any contact between the two surfaces. Again, he observed that asthmatic attacks ceased after the removal of a septal spur which pressed upon the turbinated body; but if in another case the turbinated body was cauterized before the spine was cut the attacks were increased, because the swelling consequent upon the burning still further induced contact between the surfaces. One of his asthmatic patients who suffered from polypi was able to control the seizures by plugging his nostrils with cotton-wool. Again, sufferers from vasomotor rhinitis may subdue the fits of sneezing by compressing the nostrils. He concludes from these facts that the reflex is caused either by the current of air passing during respiration over hyperæsthetic parts or by mechanical irritation of hanging polypi moved by the inspired air. Hence it is essential for successful treatment that all contact between the septum and the outer wall should be removed. Owing to the close approximation of the middle turbinal to the septum, very little swelling of either structure may produce contact. In regard to the possible existence of a septal swelling, Meyjes draws attention to hypertrophy of the tuberculum septi; in two cases he had been able to remove from this area a piece of tissue the size of a pea. Apart, however, from the question of contact between two surfaces as the origin of a nasal reflex—a fact already well known—a second point is worthy of consideration, namely, the movement of two surfaces against each other as a cause of irritation. Small polypi may be moved up and down by the current of air, and thus cause friction against the septum or middle turbinated body. Small and seemingly insignificant structures may be overlooked and keep up irritation sufficient to produce reflex symptoms; their removal may prevent the return of an asthmatic attack.

---

[1] Journal of Laryngology, London, December, 1898.

THE NASAL ACCESSORY SINUSES.

Frequency of Infection. The greater attention paid to this subject during recent years and the improved methods of diagnosis have undoubtedly contributed largely to the increase in the number of cases met with, yet it is more than probable that there is an actual increase in the number of cases of purulent infection of the accessory sinuses, due to the greater frequency and prevalence of the influenza epidemics.

Some interesting post-mortem observations have been recorded by Kieer, of Copenhagen, and Lapalle, of Pau. Kieer[1] examined the accessory sinuses in 200 post-mortem cases in which death was due to various causes. As five of the post-mortems were made in children under ten years of age, they were not included, and the conclusions are, therefore, based upon the examination of 195 cadavers. Eighty-nine were males and 106 females. Although this information is given, no statement is made as to the relative frequency with which pus was found in the sinuses of one or the other sex. Empyema of the maxillary antrum existed in 39 cases, and in 9 of these the affection was bilateral. Empyema of the sphenoidal sinus was found in 29 post-mortem, and of these 17 were bilateral; empyema of the ethmoidal cells was found in 7 of the examinations, the condition being bilateral in 1. In 13 cases there was empyema of the frontal sinus, and in 2 of these the affection was bilateral. The presence of pus in more than one cavity was also frequently noticed. The total number of post-mortems in which pus was found was 88, and of these apparently there were 21 in which a combination of affected sinuses was met with.

---

[1] Laryngoscope, St. Louis, February, 1899.

Lapalle,[1] of Pau, has studied the subject from the same aspect, and his observations are based upon 169 autopsies. It is unnecessary to detail the cause of death in all these cases, but one group of causes must be referred to as being of special interest in connection with the subject we are now considering: 59 cases are grouped together under pulmonary or meningeal tuberculosis, and of these we find 19, or 32.2 per cent., with a sinus affection; of these 11 were females, in which sinus empyema was found in 2; the remaining 48 were males, and empyema was found in 17. It would be interesting to know in what proportion of these cases the sinus condition was tubercular. Lapalle shows the relative frequency with which the affection was met with in the two sexes. In 56 autopsies made on women, 12 of the cavities were found affected, while in 113 men 43 were recorded. Although twice the number of male bodies were examined, the proportion of diseased cavities in that sex far exceeded that of the females. The maxillary sinus stood first on the list, with empyema in 48; the sphenoidal followed next with 19, then the ethmoid cells in 6 bodies, and lastly the frontal in 5. In 16 cases both maxillary antra were affected, in 9 both sphenoidals, in 1 the ethmoid cells on both sides, and in 3 cases both frontal sinuses were diseased. If we study the number of instances in which there was concomitant empyema in more than one group, we find that ethmoid and frontal suppuration never occurred without an associated suppuration in some of the other cavities, while the maxillary and sphenoidal sinuses were frequently found affected in association with other cavities.

A study of these figures raises more than one point of interest; one naturally asks one's self whether in some instances pus in this locality may not be the cause of death, while in others, again, may it not be secondary to the affection which eventually proves fatal. If all the individuals whose autopsies are recorded by these two observers suffered during the latter part of life from chronic empyema of their accessory cavities, the percentage of persons going about with this complaint must be a fairly large one. A sufficient number of post-mortem examinations is now recorded to show that deaths from meningeal and cerebral complications have followed suppuration in one or more of these cavities when no opportunity had been afforded of diagnosing the exact condition during life. Two other points are also made very clear: the combination of sinuses affected in one individual and the frequency with which the sphenoidal sinus may be the seat of pus. With regard to the first point, which is now a well-established clinical fact, we find a frequent combination of frontal and maxillary sinusitis. Out of the thirteen cases of frontal suppuration reported by Kicer, the antrum of Highmore on the same side was affected in seven, while in Lapalle's five frontal cases the antrum was combined in three. I shall refer to this fact again. Perhaps the most striking result obtained from these post-mortem examinations is the frequency of sphenoidal sinus suppuration—twenty-nine recorded by Kicer, nineteen by Lapalle—standing next in order of frequency to the maxillary antrum and certainly out of proportion to the clinical experience of most observers. If the outset of suppuration in this cavity is not a feature of the fatal illness of the patient, these figures suggest that sphenoidal sinus suppuration must be frequently overlooked during life.

---

[1] Archives internationale de laryngologie, May and June, 1899, No. 3.

The frequency with which frontal and antral empyema coexist must not be passed over without some further reference being made to it. Attention has already been directed to the work of Fillibrown, Bryan and others upon this point,[1] which further clinical experience has substantiated. The frontal sinus may infect the antrum and the antrum may infect the frontal sinus.

A very valuable and exhaustive piece of work has recently appeared from the hand of Howard Lothrop,[2] of Boston, and in it the anatomy of the small region lying between the frontal sinus and the ostium maxillare has been carefully studied. This ostium is situated in a depression at the lowest part of the infundibulum. The infundibulum is a sort of foyer, having the nasal cavity on one side and communicating on the other with the frontal sinus through the nasofrontal canal, with certain of the anterior ethmoidal cells and with the maxillary antrum. If pus reaches the infundibulum from the frontal sinus or ethmoidal cells it tends to gravitate toward the ostium maxillare, and may enter the antrum through that orifice, the latter cavity becoming a reservoir for the pus. As the frontal sinus occupies the higher position anatomically when the head is held erect, this is certainly the more frequent sequence; but the position of the head varies very considerably, and there is the possibility of the pus finding its way from a diseased antrum into the frontal sinus. The practical importance of these points becomes at once evident. If in cases of combined fronto-maxillary empyema the antrum alone is treated in the first instance, no resulting cure may follow, and it was owing to the obstinate nature of some of these cases that Fillibrown was led to suspect a persistent infection from the frontal sinus. In the discussion on chronic empyema of the frontal sinus at the Portsmouth meeting of the British Medical Association, Herbert Tilley[3] laid stress upon the importance under these circumstances of first treating the frontal, and quoted a case where the opposite procedure had been carried out, with consequent failure. Both cavities, however, may be satisfactorily treated at the same time. Hinkel,[1] of Buffalo, has described a case in which suppuration in the frontal and maxillary sinuses of the same side was diagnosed, the latter cavity was opened, drained and irrigated, and for a time the symptoms were ameliorated, though some discharge from the antrum always persisted. No cure was effected until the frontal sinus was opened and curetted, when the antrum at the same time ceased to discharge. Furet,[2] of Paris, records a case which may or may not be one in which the pus from the frontal sinus drained into the antrum; the radical operation was performed upon the frontal, and a cure of both cavities resulted. The only treatment which the antrum received consisted in washing that cavity out on a few occasions by puncturing the inferior meatus of the nose. As suppuration in the antrum of Highmore may be cured by irrigation of this kind, a possible fallacy exists here.

---

[1] PROGRESSIVE MEDICINE, March, 1899, Vol. I.

[2] Annals of Surgery, November and December, 1898, and January and February, 1899.

[3] Journal of Laryngology, London, September, 1899.

The possibility of frontal sinus infection from the antrum should not be lost sight of—a consequence which may be brought about by the surgeon or by the patient himself. The treatment of the antrum by too forcible irrigation, more especially with the head held forward as it is during the process of syringing, may lead to such an unfortunate accident as this. A certain difficulty in obtaining positive proof of secondary frontal infection naturally presents itself because the symptoms and signs of antral suppuration may mask a previously existing frontal condition.

Fatal Cases of Accessory Sinus Empyema. Secondary infection of the brain and its meninges may prove fatal as the result of a chronic suppurative process in the sphenoidal, ethmoidal, or frontal air sinuses. In the valuable monograph written by Dreyfuss in 1896 a number of cases of this kind were collected and recorded. At the present moment, however, I wish rather to draw attention to the same sequence of events which may develop after operative interference upon the sinuses. When operation is so frequently undertaken, of which there is abundant evidence in present-day literature, it is well to pause and consider such possibilities. The record of these fatal cases is of great value and the details of them should be carefully studied. Gibson,[3] of New York, reports a case of this kind, which has a double interest owing to the anatomical condition met with. The patient had suffered from symptoms of frontal sinus suppuration for three years, but at the end of the first year the left sinus had been trephined and drained through an external opening.

---

[1] Proceedings of American Laryngological Association, May, 1899.

[2] Archives internationale de Laryngologie, November and December, 1898, No. 6.

[3] American Journal of the Medical Sciences, March, 1899.

Frontal headache and discharge had persisted, however, and at the end of three years the left sinus was again opened up, the right one at the same time being opened by breaking down the intervening septum. It also contained pus under considerable tension. A rubber tube was passed into the left nasal fossa and irrigation practised. Two days after this operation meningitis supervened, and death occurred on the ninth day. At the autopsy the posterior wall of the *right* sinus was found to be absent, and in its place there was a nearly circular opening, the bony edges of which were smooth and well defined, the dura mater behind being thickened and covered with granulations. The cribriform plate of the ethmoid was in part carious. The posterior wall of the *left* frontal sinus was perforated in two places. The author was inclined to think that the absence of the posterior wall on the right side was due to a structural defect in the sinus, and not the result of erosion, as was probably the case in the left sinus.

Luc,[1] of Paris, details at considerable length the history of a patient who died with acute septic osteomyelitis of the cranial vault, followed by meningitis and probably cerebral abscess. Both frontal sinuses and both antra contained pus, and the patient had submitted to more than one operation. The last operation consisted in opening and curetting the frontal sinuses and such of the ethmoidal cells as were accessible, the left nasal frontal duct being opened up in this way. No drain was used; the external wounds were closed. Two days after an unsuccessful attempt to wash out the frontal sinus an abscess formed over the left eye. This proved to be the commencement of a series of complications. Pus rapidly spread over the frontal bone beneath the periosteum and from thence to the parietals, the bones becoming eroded; the septic process spread, notwithstanding repeated and free incisions, and death followed from meningeal and cerebral complications. In Herbert Tilley's case, reported, as was the previous one, at the meeting at Portsmouth of the British Medical Association, both the frontal sinuses and the ethmoidal cells contained pus. The right sinus was opened through an external eyebrow incision, and the left was curetted and drained through the intervening septum, which was found perforated; the right nasofrontal duct was enlarged and a tube passed into the nose; the external wound was closed. Ten days later the right sinus had to be reopened and the nasal passage enlarged, the left sinus on this occasion being opened up through an external incision. Subperiosteal abscesses formed over the frontal and parietal bones, and necrosis of the outer table took place; sinus thrombosis and minute cerebral abscesses formed, and the patient succumbed after a lingering illness. Rudloff's case, reported at the same meeting, must also be referred to, as it differs somewhat from the others. Both antra, both sphenoidal and both frontal sinuses were affected. The first two had been previously treated. The left frontal sinus was opened from without, but a second operation proved necessary a few weeks later, when the posterior wall of the sinus was found to be diseased ; this was removed and the right sinus at the same time opened. Some days later symptoms of extradural abscess developed, followed by aphasia, facial paralysis, and other symptoms. The skull was trephined and a subdural abscess evacuated, but death followed from a purulent leptomeningitis.

---

[1] Journal of Laryngology, London, September, 1899.

In all these cases fatal symptoms followed the operation upon the sinuses. I have purposely described the treatment adopted with some detail so as to bring out the thorough nature of it. These cases also afford ample proof of the risks that may be run from opening these cavities and the almost hopeless difficulty in combating a septic osteomyelitis. It is probable that the free curetting of the sinuses, combined with the difficulty in such cases of getting rid of all the foci of infection, may be accountable for the rapidly septic complications.

The Frontal Sinus. PROBING THE SINUS. Although the diagnosis of chronic suppuration may be considered fairly easy in some cases, in others considerable difficulty exists, due partly, but not altogether, to the presence of pus in one or more of the other sinuses. If the sinus can be successfully probed through the nasal passage by means of a suitably curved canula, and then irrigated or inflated through this tube, a certain diagnosis can be established. But it is not possible to effectually carry out this procedure in every case. It is very often a difficult and impossible operation on the cadaver and even in the dried skull ; it is difficult in the living person, more especially in those cases where it is most desired to accomplish it, owing to the swollen condition of the mucosa and the presence of polypi due to the presence of pus. I have experimented with the probe in a very large number of macerated skulls, and, without being able to state definitely the exact percentage of skulls in which probing of the sinus was successful, in the majority it was not possible without some damage accruing to the middle turbinate bone. In those skulls in which the middle turbinate had been partially broken or destroyed little difficulty existed, thus demonstrating anatomically the now well-recognized clinical fact that in the majority of cases the anterior end of this bone must be removed before the frontal sinus can be successfully probed. The difficulty does not lie, as a rule, at the upper end of the frontonasal duct, but lower down in the nasal fossa.

Kicer[1] states that he was able to successfully probe the frontal sinus from the nasal cavity in about 48 per cent. of the cadavers upon which

[1] Op. cit.

he experimented. As the result of very considerable experience on the dead subject, Howard Lothrop[1] found that the passage of the probe through the nares was attended with many difficulties if the middle turbinated bone was left undisturbed, and he adds somewhat pointedly that one can never be certain that the point of the instrument is in the sinus —a statement which I am prepared to support. It must be borne in mind that the removal of a portion of the middle turbinate body has a double advantage, for not only does it permit of a more successful probing of the sinus, but it insures better drainage whether the purulent condition is treated by the endonasal route or through an external incision.

ILLUMINATION OF THE SINUS. Illumination is still a vexed question, some authorities finding it of value in diagnosis, while others can place little or no reliance upon it. No better proof of this difference of opinion can be furnished than that which is afforded us by a study of the various clinical papers in which reference is made to this test. It seems to me that there is considerable anatomical ground for considering the test an unreliable one. One or both frontal sinuses may be absent, and even when a perfectly healthy sinus is present it does not necessarily illuminate. I have illuminated 560 skulls of various races of men, and have drawn the following conclusions from that examination: Of 560 skulls there were 402 which had both sinuses present, 85 which had both sinuses absent, and 73 in which there was only one sinus. It should be stated here that proof of this was obtained by other and more certain means of illumination; to make the statement that a sinus did not exist merely because there was no illumination would be far from correct. In every case the lamp was placed first under the inner third of one supraorbital margin and then beneath the corresponding area of the other. It was found, further, that in no instance where the frontal sinus was absent was any area of illumination produced. Of the 402 skulls which had both sinuses present 119 failed to illuminate on either side, while 60 did not illuminate upon one side. Of the 73 skulls in which one sinus was absent, and, therefore, negative to illumination on that side, we find that the single sinus present on the opposite side may or may not illuminate; in 42 of the skulls the single sinus did illuminate, in the remaining 31 it did not. Further, it was also observed that in a number of skulls in which both the sinuses illuminated the two sinuses did not always illuminate with the same intensity. From these facts, therefore, we find that where there is no sinus there is no illumination, and that this may occur on one or both sides; that there may be sinuses on both sides failing to illuminate, or a sinus on both sides with one of them negative to illumination, and, lastly, that there may be no illumination on either side, and yet a sinus be present on one side and not on the other. The fact that a sinus may be present and fail to illuminate is of more clinical significance than the absence of a sinus and no area of illumination. With such anatomical facts as these the value of illumination in the diagnosis of chronic frontal empyema must necessarily be weakened. The clinical value of illumination is based upon the presence of opacity and upon a comparison of the results on the two sides. Unfortunately for diagnostic purposes, a frontal sinus containing pus and polypi may still illuminate; I have seen several examples of this. It may, however, illuminate less brightly than the sinus on the opposite side; this inequality may also be found in the healthy skull and in the healthy individual. On the other hand, a sinus containing pus and polypi may be opaque. There are, therefore, clinical uncertainties as well as anatomical difficulties, both tending to weaken illumination as a diagnostic aid. It is of greater value in treatment than diagnosis, and I would prefer to see a diseased sinus illuminate rather than remain opaque, and endeavor to diagnose the condition from other signs. If there is illumination there must be a sinus; if there is opacity, there may be pus; but there might be no sinus, or there might be a healthy sinus present.

---

[1] Op. cit.

OPERATIVE TREATMENT OF FRONTAL SINUS SUPPURATION. A very interesting discussion on "The Diagnosis and Treatment of Chronic Empyema of the Frontal Sinus" was held at the Portsmouth meeting of the British Medical Association, in August, 1899.[1] It was the general consensus of opinion that the external operation was necessary in the more severe cases, as it afforded a safer and a surer means of attacking the diseased cavity. Although any attempt to break into the sinus from the nose was deprecated, some of the speakers were in favor of treatment through the natural passage in some cases. Removal of the anterior end of the middle turbinate and the establishment of freer drainage, both by this means and by snaring and curetting the polypi present, met with approval from some of the members. With regard to the external operation, again, there appears to be a growing tendency to dispense with the drainage-tube between the sinus and the nose. Such was the view expressed by Moure, Luc, Bryan and others. Moure, indeed, considered that if the sinus were exposed and rendered aseptic, and if a free communication were established with the nose by opening up the fronto-ethmoid region, no drainage-tube was necessary. The removal of a portion of the middle turbinate prior to the operation greatly assists this drainage.

It is not my intention to recapitulate here all that has been written on the technique of the operation, but rather to draw attention to one or two modifications in the external operation described during the last year. Before taking up these points, however, a short description of a new method of entering the sinus from the nose will be given.

---

[1] Journal of Laryngology, London, September, 1899.

Spiess[1] claims to have overcome the risk associated with the opening of the frontal sinus from the nose by controlling the movement of his drill with the aid of the X-rays. On this account he is a warm advocate of the intranasal route, contending that it should, in the first instance, be employed in all cases. He has himself operated upon ten patients in this way. The method adopted is as follows: The lining membrane of the nose is thoroughly cocainized and a drill 3 mm. thick and driven by an electric motor is introduced into the nose and placed as near the nasal roof as possible. The room is then darkened and the shadow of the head is thrown upon the fluorescent screen. In this way the position of the sinus cavity and of the drill is ascertained, and the point of the latter is so directed that it will enter the centre of the sinus. As the drill is driven upward its progress is observed upon the screen until it is seen to enter the sinus. From time to time the boring is interrupted so as to prevent the drill from becoming too hot, but the operation is completed in a very short time, without any hemorrhage. After the operation the patients complain of a humming sensation in the head. In one case the introduction of the canula eight days after the operation was so painful that in spite of cocaine it was no longer possible.

The External Operation. Walker Downie,[1] of Glasgow, reports very favorably upon a method of operating which, in the five cases detailed by him, has given very satisfactory results. He commences by removing, under cocaine, the anterior third or more of the middle turbinated bone with the electric cautery and cold-wire snare; the fronto-ethmoidal cells are then curetted as far as possible from this aspect, thus permitting of freer drainage from the frontal sinus. When these surfaces have healed the external operation is carried out under chloroform. In the event of one sinus only being affected, the eyebrow incision is made. It is unnecessary to detail here the various steps of the operation; the point of interest lies in the treatment of the cavity after it has been cleaned out. A free passage into the nose is further insured by curetting from above any of the remaining ethmoid cells which were not reached from the interior of the nose. No drainage-tube is inserted, but the whole frontal sinus is firmly packed with cyanide gauze, and the end of the packing is brought out through a small buttonhole made in the upper eyelid close to the inner canthus of the eye. The eyebrow incision is completely closed. The packing is left in the sinus for from seven to fourteen days and then withdrawn through the small buttonhole. The results obtained by Downie were good. I have had an opportunity of operating in the same way with an excellent result, removing the plug from the sinus upon the sixth day.

---

[1] Op. cit.

[2] Glasgow Medical Journal, May, 1899.

In reference to the question of establishing free drainage between the frontal sinus and the nose, and of obtaining at the same time more efficient treatment of the affected ethmoid cells, Röpke's[1] paper must be considered of value. His experience has been large, and, therefore, his views command attention. Owing to the frequency of associated frontal and ethmoid suppuration, he has practised removal of a part of the inferior wall or floor of the sinus. Briefly, the steps of the operation are as follows: Through a combined horizontal and vertical incision a subperiosteal resection of the anterior sinus wall is made as advocated by Kuhnt. After curetting the diseased lining membrane, a part of the inferior sinus wall is removed, so that the ethmoidal cells may in this way be examined. These are broken and their lining membrane scraped so that a large communication is established with the nose. The whole cavity is then stuffed with iodoform gauze, the end of the plug being brought out at the inner end of the horizontal skin incision. After three days this is removed. If suppuration exists in both sinuses he carries the horizontal incision across the middle line and along the supraorbital margin of the other side, the vertical incision joining it in the middle at right angles. In these cases the anterior wall of both sinuses and the septum and the nasal processes of the frontal bones are removed; the large single cavity is plugged with gauze, which is brought out on one side only, the wound being completely sutured on the other side. An extensive operation of this kind upon large sinuses necessarily leads to deformity. Röpke had operated upon twenty-five patients in this way, thirteen with a unilateral and twelve with a bilateral affection.

When the frontal sinus is large and a considerable area of bone forming the anterior wall is removed, a depression and a certain amount of disfigurement certainly follows. In some of the photographs shown by Röpke, of Solingen, at the Portsmouth meeting already referred to, this deformity was seen. The sinuses in these cases were large.

Lothrop,[2] whose work we have already quoted, describes an operation which is similar in its principle to one which has been carried out on the skull in certain cases of trephining. A flap of bone and periosteum is turned down, the sinus is inspected, and the bone is then replaced. After a trial upon the cadaver he practised it in one instance upon a patient. The incision in the soft parts is a curved one, commencing over the upper part of the nasal bone near the fronto-nasal suture; it is then carried upward parallel with the folds of skin made by the corrugator supercilii muscle for about 15 mm., gradually curving outward over the glabella above the eyebrow. The periosteum is not disturbed. Before any bone flap is made a small opening is made into the sinus through its anterior wall above the inner angle of the orbit. By means of the probe passed through this opening the size of the cavity is more or less determined. If small, no elongation of the incision or bone flap is necessary, but if it is found to be large and extending up to or beyond the supra-orbital notch, the incision must be prolonged horizontally outward to the notch. The bone flap is now chiselled along a line corresponding to the skin incision and starting from the small exploratory opening in the bone. Toward the middle line it is chiselled as far as the fronto-nasal suture, and from that point it is carried directly downward and backward toward the orbital plate of the frontal bone. From the external extremity of the horizontal bone incision the chisel carries the incision downward across the supra-orbital margin to meet the orbital plate. The bone flap thus formed is forced forward so that it fractures along the thin orbital surface or floor of the sinus close to the supra-orbital margin. It is retained by the periosteum adherent to it. After the sinus has been inspected and treated the bone flap is replaced and the wound closed over it.

---

[1] Archives für Laryngologie, Berlin, 1898, Band viii., Heft 3.

[2] Op. cit.

C. A. Ballance,[1] of London, has published the account of a case in which he relieved by artificial means the deformity following the removal of a considerable area of bone. The patient applied for relief nine months after the primary operation upon the sinus. A piece of pure platinum was prepared to fit accurately the depression in the bone. The plate weighed 183.5 grains; this metal was chosen because it gave the necessary rigidity and would in no way be affected by the tissue. A skin flap was raised from the forehead and the bony edges of the depression carefully defined; the sterilized plate was then introduced, four fine holes were drilled through it, and at corresponding points in the bone four similar holes were made; through each of these a fine platinum wire was passed, so that the plate was thus anchored by two sutures in the upper border and two along the supra-orbital margin; the skin flap was replaced. When the patient was seen eight months later the result was found excellent; there was no deformity and no inconvenience from the presence of the plate.

---

[1] St. Thomas' Hospital Reports, 1897, vol. xxvi.

THE USE OF CERTAIN ANÆSTHETICS IN AFFECTIONS OF THE NOSE AND THROAT.

Schleich's General Anæsthesia. The experiments of Schleich, of Berlin, on the production of general anæsthesia by the use of certain agents, described as "Schleich's mixtures," are sufficiently well known to enable us to dispense here with any detailed account of their composition. A brief note, however, concerning the ingredients in these mixtures will not be out of place before anything is said with regard to their use in nose and throat work. They are three in number, and each contains in different proportions the following constitutents: Sulphuric ether, petroleum ether, and chloroform . No. 1 mixture is suggested for light, transient anæsthetization ; No. 2 where a deeper anæsthesia is deemed necessary, and No. 3 when a more prolonged surgical operation is to be performed. The accompanying table shows the proportions :

	No. 1.	No. 2.	No. 3.
Sulphuric ether . . .	180 parts.	150 parts.	80 parts.
Petroleum ether . .	15 "	15 "	15 "
Chloroform . . .	45 "	45 "	30 "
Boiling-point . . .	38° C.	40° C.	42° C.

A further explanation is still necessary. Schleich held that if a mixture was inhaled the boiling-point of which was nearly equal to the body temperature, its inspiration became easy, and it left the body without producing any dangerous results. He further claimed that there were no unpleasant complications or after-effects produced by its administration. Clinical experience goes to show that by this method anæsthesia rapidly supervenes without the stage of excitement so frequently observed in the ordinary use of ether or chloroform, and that there is a rapid return to consciousness, with the faculties unblunted. Vomiting is also a rare complication. In a paper read by Meyer before the Medical Society of the County of New York, in December, 1897, the feeling was expressed that in addition to the points just noted there was no accumulation of mucus in the trachea, and that bronchitis and bronchopneumonia did not occur. In some cases of valvular heart disease it was administered without any injurious effects. With such considerations as these in its favor, anæsthesia thus induced should prove serviceable in operations upon the nose and throat where a rapid return to consciousness is an advantage in post-operative hemorrhage.

In America considerable attention has been paid by the general surgeon to the employment of Schleich's mixtures, while Emil Mayer,[1] of New York, has made a fairly extensive use of it in this special department of surgery. In seventy operations about the nose and throat anæsthesia was produced by this means (the No. 1 mixture being employed in the majority of them). In the earlier cases No. 1 was not administered, owing to the fear that its action might prove too evanescent, but later experience showed that such was not the case. The only difference which appeared to exist lay in the fact that a little more time was occupied in getting the patient anæsthetized when No. 1 was used. It is not my intention to give a detailed account of Mayer's cases, but rather to emphasize certain clinical points which may guide others in its employment. The patients operated upon ranged from two years of age to middle life; the operations were chiefly for the removal of adenoid vegetations and the correction of deflected nasal septa. The amount of the solution necessary to produce anæsthesia varied. Thus, in some cases four drachms sufficed, and while this was the minimum amount in any case, it was also found to be sufficient in the majority of the cases. In others, again, five, six, and eight drachms were administered. In two cases of deflected septum twelve drachms were required, while in one, two ounces proved necessary. In this last instance ether was substituted, owing to the long duration of the operation. When comparing the amount of the mixture used with the age of the patient to whom it was given, we find that a certain relationship exists, though not generally observed throughout the series. Children undoubtedly required less than adults; nevertheless in one patient of twenty-nine years, and in another of thirty-two years of age, only six drachms were used. Another point of practical interest lies in the time required to produce complete anæsthesia. The average time was found to be four minutes. Here, also, the question of age played its part. In one child, aged two years, only one and a half minutes were required, and in another, aged five years, two minutes sufficed. With two exceptions, all who took more than the average time of four minutes might be considered as adults. In one case seven minutes were required, and in another as much as nine. As already indicated, there was no stage of excitement; the tension of the pulse increased during the administration, and the breathing was quiet and natural. Unconsciousness was first indicated by the absence of the conjunctival reflex, occurring on an average in four minutes. From three to five minutes after the production of anæsthesia the patient was fully restored to consciousness. In five of the twenty-three cases detailed, vomiting occurred after the operation. Mayer himself does not appear to have met with any untoward results while using these mixtures, but this has not been the experience of every surgeon, as cases of alarming asphyxia have been reported by some.

---

[1] New York Medical Journal, October 15, 1898.

As I have made no trial of this anæsthetic, I can offer no personal opinion upon its practical value. A careful perusal of Mayer's results, which were excellent in themselves, hardly induces one to substitute Schleich's mixtures for the ordinary chloroform administration, at any rate when operating upon children. Neither in the amount of anæsthetic used, nor in the duration of time necessary to produce narcotism, nor yet in the duration of the period of anæsthesia, does it appear to possess advantages over the pure drug. Indeed, it may be said that a larger quantity of the mixture appears sometimes to be necessary, and in my experience with chloroform it is extremely rare to find that anæsthesia is prolonged beyond the time required for the satisfactory performance of the operation. With regard to vomiting, though opinions may differ on this point, it appears to me to be a very satisfactory conclusion to an operation upon the throat—*e. g.*, removal of adenoids, as the patient at once gets rid of the blood which is so frequently swallowed.

Schleich's Local Anæsthesia. In addition to the general anæsthesia obtained by the method above described, Schleich has brought under the notice of the profession a plan whereby not only the superficial, but also the deeper tissues, may be rendered anæsthetic. This has been spoken of as the "infiltration method," and consists in the injection into the area of operation of a sterilized fluid. The original solution used by Schleich has been substituted by a solution containing eucaine B., chloride of sodium, and distilled water in the following proportions:

Eucaine	0.2
Sodium chloride	0.6
Aqua destillata	100.0

It would be out of place to refer to the use of the "infiltration method" in general surgery; the subject has been introduced here for the purpose of drawing attention to its employment in certain operations upon the nose. Quite recently Baumgarten,[1] of Budapest, has made extensive use of this method of producing local anæsthesia in operating upon deviations and crests of the nasal septum, especially by means of the chisel and hammer. When operating in this way under cocaine he found that his progress was much impeded by the bleeding and by the pain complained of by the patient. On the other hand, after the preliminary injection of Schleich's mixture, he obtained certain real advantages which induced him to continue its use in these cases. The pain was greatly diminished, thus enabling the patient to submit more readily, while the bleeding was hardly a subject for consideration. The operation was thus accomplished in a much shorter space of time, and after the chiselling a thorough inspection of the parts was possible. Both to patient and operator, therefore, an essential service is thus rendered.

---

[1] Archives für Laryngologie, Berlin, 1899, Band ix., Heft 3.

When first employed by Baumgarten for this purpose, the original Schleich's solution was used; but he has since then substituted eucaine and common salt in the proportions already indicated. After painting the mucous membrane of the septum with a 10 per cent. solution of cocaine, in order to prevent the injection from being painful, a Schleich's syringe, fitted with a curved needle, is carefully disinfected and filled with the fluid. The injection is then made at the spot where the chisel is to be applied, care being taken that the needle is slowly pushed under the mucous membrane and the fluid forced into the tissues without any escape outward; it is thus driven in all directions—backward, upward, and downward.

If the deviation is in the anterior part of the septum, one injection will suffice in most cases; but if the deviation is more extensive, two additional punctures are made, one above and the other below the original one. If it extends for a considerable distance along the septum to the deeper parts of the nose, then the needle must be forced slowly still further along the septum, or with a curved needle one makes a fresh injection back still further than the original one. After delaying for a few seconds, one observes whether any bleeding occurs from the seat of the puncture, and if so the nostril is plugged. This method of producing anæsthesia has also been found of value in tracheotomy; thus there is another indication for its use.

Menthol, Carbolic Acid, and Cocaine as a Local Anæsthetic. The solution introduced by Bonain[1] for the purpose of producing local anæsthesia may be described as a cocainized solution of menthol and carbolic acid. The hydrochlorate of cocaine easily dissolves, and thus forms a mixture with the two others. If the proportion of carbolic acid is less than that of the menthol the combination is not satisfactory. With an increase in the amount of phenol the caustic properties of the mixture become more marked, and on this account two preparations have been prepared, the first of which is simply anæsthetic, the second being both anæsthetic and caustic:

I.—Pure carbolic acid,
Menthol,
Hydrochlorate of cocaine . . āā 1 gramme.
II.—Pure carbolic acid . . . . 1 gramme.
Menthol,
Hydrochlorate of cocaine . . āā 50 centigrammes.

Bonain has made use of this mixture as a local anæsthetic in operations upon the tympanic membrane and tympanum, but with regard to its use in that region we shall not say more here save that it has been employed with successful results. In the nasal fossæ it has found a practical and useful application in exploratory punctures of the antrum through the inferior meatus in operations with the galvano-cautery upon inflamed tissue where the ordinary solutions of cocaine did not appear to act very efficaciously. Further, when anæsthesia was required at the anterior orifice of the nasal fossæ and at the edge of and on the inner surface of the nostrils, where a solution of cocaine has little action, then the application of this agent was found useful.

---

[1] Revue hebdomadaire de Laryngologie, Bordeaux, June 17, 1899.

In the pharynx the mixture was of service in cauterizing granules, and when destroying the adenoid tissue at the base of the tongue. Cocaine does not usually produce sufficient anæsthesia in the region of the lingual tonsil, and when the menthol and carbolic acid are added it is much more efficacious. In the larynx complete anæsthesia of the epiglottis and infiltrated arytenoid cartilages has been obtained, thus permitting of an active use of the galvano-cautery. The most remarkable result, however, followed its local use in the dysphagia of tuberculosis and in ulceration of the pharynx. After the ordinary remedies had produced only moderate and temporary ease this anæsthetic solution brought about complete and more lasting relief, the duration of which was sometimes evident for four days. In using the caustic solution for tubercular ulceration there was a distinct advantage gained by first painting the larynx with a weak solution of cocaine, so as to prevent the sensation of smarting produced by the caustic. Bonain, in summing up his experience, comes to the conclusion that the three qualities—the anæsthetic, slightly caustic, and strongly antiseptic—make this application one of great usefulness.

THE USE OF CERTAIN THERAPEUTIC AGENTS IN THE NOSE AND THROAT.

Protargol. Since the introduction of protargol by Eichengrün, in 1897, various writers have experimented clinically with it, mainly in the department of genito-urinary surgery and in ophthalmic practice. More recently, however, it has received a certain amount of attention at the hands of rhinologists and laryngologists, and in this relation it has been somewhat extensively used by Alexander,[1] of Berlin. Protargol is an organic compound of silver with protein, and appears in the form of a bright yellow powder, which is readily soluble in water up to about 50 per cent. It is also soluble in glycerin ; consequently in these two forms it may be conveniently used as a spray. If a small percentage of glycerin be added to the simple watery solution the therapeutic value of the drug is increased, as it will tend to cling more readily to the mucous surface with which it is brought in contact. It is advisable to keep the solution in a dark-colored bottle. The almost neutral action of the liquid preparation permits of its being applied to the mucous membrane without any special irritation being induced—an advantage which all the silver preparations do not possess. Its antiseptic property is enhanced by the fact that it is not only less irritating than other silver salts, thus admitting of its more prolonged use, but that it has a greater power of penetrating the tissues. In addition to the watery solutions already referred to, protargol may be embodied with vaseline as an ointment or used in the form of a paste with oxide of zinc and starch. The strength of the watery solution employed varies according to the nature of the affection for which it is applied.

---

[1] Archives für Laryngologie, Berlin, 1899, Band ix., Heft 1.

While the results obtained were not favorable throughout the whole series of experiments, in certain conditions they were certainly very gratifying; it will, perhaps, be more satisfactory to glance at some of these now. Looking first at the acute inflammations, such as tonsillitis, pharyngitis, and laryngitis, we find that favorable results were not obtained by Alexander. Painting the tonsils in angina lacunaris with a 10 per cent. watery solution of protargol did not appear to be successful, and in one case it was not possible to prevent the onset of a peritonsillar abscess. In pharyngomycosis leptothricia this solution also proved to be disappointing. In the same way similar results were met with in the treatment of diphtheria, in various forms of ulceration of the mucous membrane of the mouth and pharynx, in aphthous and in specific and tubercular ulcerations. In the latter condition, in spite of repeated applications gradually strengthened up to 50 per cent., no improvement manifested itself. In laryngeal phthisis it was necessary to give up this form of treatment on account of an aggravation of the objective appearances.

If the use of protargol had been confined to such affections as those just enumerated, its employment might at once have been discontinued in nose and throat practice. Fortunately, however, a more gratifying account can be given of it in other conditions. In chronic catarrh of the nose, nasopharynx, pharynx, and larynx, treatment was carried out with it in 125 cases. A 1 per cent. solution was used; while the pharynx was painted with this, the nose and nasopharynx were sprayed and douched and the larynx injected. Where the nasal mucosa was atrophied glycerin up to 25 per cent. was added. The results obtained were quite satisfactory. Solutions of 0.5 per cent. possess a slightly bitter taste and produce a transient sensation of burning, but with 1 per cent. no disagreeable symptoms are complained of. In order to test the efficacy of the remedy more accurately, control experiments were carried out in these cases of chronic catarrh of the upper air-passages. Thus, the pharynx and larynx were treated, while the nose was left untouched, with the result that the symptoms in the former disappeared, but the discomfort in the nose remained as before. In cases also which had been previously treated with other remedies without success, protargol effected improvement. Especially gratifying results were obtained in the chronic laryngitis of singers, where a 0.5 watery solution was injected into the larynx.

Turning from the consideration of such catarrhal affections as these, we find that the author highly recommends its use in the treatment of chronic empyema of the antrum of Highmore. He is careful, however, to point out that it is in those cases in which there is simply a purulent inflammation of the cavity without any secondary changes in the mucous lining that the success is obtained. It is, indeed, necessary to emphasize this fact, as along with other simple remedies protargol will fail to effect a cure when a polypoid condition of the mucosa exists. So confident is Alexander of the value of this application in simple uncomplicated empyema of the maxillary antrum that he pronounces it to be more satisfactory than any remedy yet introduced. If we examine the procedure which he adopts, we find that a 5 per cent. solution is used in the following way: After the cavity has been washed out with sterilized water, 50 c.c. of the 5 per cent. solution is injected by means of a syringe through the alveolar opening, with sufficient pressure to force some of the fluid through the natural orifice into the nose. This treatment is repeated daily. The quantity of pus diminishes, and the fluid washed through gradually becomes clearer. Eleven cases out of sixteen were successfully treated in this way, and in five of the successful cases an examination made two to three months later determined the continued success of the result. In the remaining six further treatment was stopped after the fluid washed through had remained clear for some weeks. In the five cases which were not cured by injections of protargol the polypoid changes in the mucous membrane had already taken place, and in two of these there was associated empyema of other cavities. An attempt to wash out the ethmoid cells with a 2 per cent. solution was followed in each case by violent headache, which commenced about two hours after the application.

Stimulated by Alexander's results, I have tried this remedy in antral suppuration, but sufficient time has not yet elapsed to permit of the expression of a definite opinion on the matter. No inconvenience following the injection has been complained of by the patients.

De Stella[1] has also devoted some attention to the therapeutics of protargol, and it is interesting to observe the conclusions arrived at by another in the same field, and to note that success has followed its use in some conditions. In acute purulent rhinitis in particular he expresses satisfaction at the results obtained by painting the nose daily with a 10 per cent. solution. The discharge ceased in from fifteen days to three weeks. In chronic hypertrophic pharyngitis it has proved more serviceable than the iodine treatment, and in chronic atrophic pharyngitis, too, it removes the sensation of dryness and heat.

---

[1] Gazette médicale belgique, 1899, No. 44.

TREATMENT OF HAY FEVER BY PROTARGOL. It is not surprising to find that hay fever has also been included among the affections which have been treated with protargol. It is necessary to employ in the first instance a weak solution, as stronger applications tend to produce symptoms of irritation. On that account a 0.5 per cent. solution in the form of a spray is sufficient; but what really proved more satisfactory than the spray was the massage of the nasal mucosa with a 5 per cent. solution. The watery secretion disappears in a few sittings if the application is beneficial, but its use must be continued so as to prevent relapses. It is necessary, moreover, to begin treatment three or four weeks before the commencement of the hay fever season if the full benefit of the remedy is to be obtained. In this affection further experience is desired before any pronounced statement can be made as to its value.

Extract of Suprarenal Capsule. Last year[1] I referred to the introduction of extract of suprarenal capsule in nose and throat practice, commenting mainly upon its use as a therapeutic agent in hay fever. It may be justly said that at that time the remedy was upon trial, and doubtless even now it may be considered by many to be in the same stage. The additions to our literature on the subject during the past year are not extensive—a fact which suggests either that its therapy has not been very generally considered or that many of those who have given it a trial have not been impressed with its special advantages. Personally I cannot speak from any practical experience with it. Newcomb,[2] of New York, after sketching the history of its introduction into practical medicine, concludes by quoting the conclusions arrived at by Swain,[3] of New Haven, in regard to its physiology. Newcomb, with a somewhat limited experience, is prepared to fully corroborate Swain's view, and regards the extract of suprarenal capsule as the most powerful astringent upon mucous membranes that we possess at present. It is neither anaesthetic nor antiseptic, and owing to the absence of the first property it cannot be used as a substitute for cocaine; as a vasoconstrictor and a contractor of erectile tissue it blanches the mucous membrane of the nose and shrivels up the turgescent tissue. The solution does not keep well, and therefore requires to be freshly made before use. The maximum strength of a watery solution appears to be fifteen grains to the drachm. In hay fever Newcomb has found that it relieves in a very great degree the nasal obstruction which results in that affection from the engorgement of the turbinated bodies. Beaman Douglass,[1] of New York, in discussing the treatment of hay fever, speaks in high terms of the internal administration of the dried suprarenal glands in order to effect a similar purpose. He considers it a safe and sure method of relieving the over-distended condition of the nasal erectile tissue. He has also applied directly to the mucosa by means of a spray a watery solution of the glycerin extract. If the internal administration is resorted to the tablets are given every two hours by day and night until some prostration, giddiness, or palpitation is complained of, or until an examination of the nose demonstrates that the local action upon the nose has been arrived at. With the cessation of discharge, the relief from irritation and sneezing, and a partial restoration of nasal respiration, the dose is diminished, being given at longer intervals, every three or six hours and then twice daily, the latter dosage being continued throughout the hay fever season. Should the symptoms reappear, owing to a too rapid diminution of the dose, it must be again increased. When used locally as a spray it is applied every three hours. Douglass is inclined to regard suprarenal capsule as a specific against the symptoms of hay fever.

---

[1] PROGRESSIVE MEDICINE, March, 1899, Vol. I.

[2] Laryngoscope, St. Louis, January, 1899.

[3] New York Medical Record, June, 1898.

The administration of this agent has not been confined to the treatment of hay fever, however, as Sargnon,[2] of Lyon, has used it in cases of laryngitis. The observations recorded by this author deal with its application in simple acute and chronic laryngitis, and also in the tubercular form. A brief *résumé* of the first case of a mild form of acute laryngitis will give an indication of the method adopted and of the result obtained. On the day following the onset of the acute attack, laryngoscopic examination showed a general hyperæmia of the cords. The careful application of a 10 per cent. solution of suprarenal capsule was then made to the larynx. Thirty seconds later another examination was made, disclosing white zones similar to the normal appearance of true cords, but separated by reddened areas. Six hours later the hyperæmia was as marked as before treatment. The cords were more sensitive to the touch, the voice was not improved, and there was slight laryngeal smarting; an hour and a half later, however, the patient felt distinctly better; the subjective sensations had almost entirely disappeared, and on the following day they did not again show themselves. In Sargnon's hands this application has given immediate results of a somewhat striking nature: at the end of a minute the hyperæmia would disappear completely from the cord which was painted, the thickening in the chronic forms appeared to decrease, while the voice became better. In no case was there even a slight toxic action produced. On re-examining the patient, however, some hours later, the redness was again found, often as intense as before the application. In several cases the voice improved and remained well. It is doubtful if any real advantage is derived from the use of suprarenal capsule in laryngitis; its action is of too short a duration and its application requires too frequent repetition to make it practicable.

---

[1] New York Medical Journal, September 2, 1899.

[2] Lyon Médicale, October 2, 1898.

CONGENITAL LARYNGEAL STRIDOR, OR INFANTILE RESPIRATORY SPASM.

The affection is in no sense a new one, and it has received a considerable amount of attention from various observers. More than a passing reference will be made to it here, not only on account of the undoubted interest which the subject presents, but because increased attention has been paid to it during the last two years from the etiological aspect. Before passing to the more recent literature which deals with it, it will not be out of place to briefly define what is meant by congenital laryngeal stridor, as various terms have been applied to what in all probability is the same series of symptoms. Although the condition had already been discussed by Lees,[1] Gee,[2] Goodhart,[3] Suckling,[4] Löri,[5] and Robertson,[6] we are specially indebted to John Thomson,[7] of Edinburgh, for placing before us the clinical features of this peculiar respiratory affection. The respiration of the infant, either immediately after birth or within the first two weeks, is accompanied by a peculiar stridorous noise occurring mainly during inspiration. When the stridor is present inspiration commences with a croaking noise and terminates in a high-pitched crow, often likened by the mother to the sound made by a hen; on the other hand, when the breathing is quiet only the croaking is heard. Expiration is accompanied by a short croak when the stridor is loud, but at other times the expiratory act is noiseless. Intermissions and variations in the intensity of the sound occur often without any apparent cause, and it continues during sleep unless the sleep is very sound, when it ceases altogether. Mental excitement intensifies it, but when the child actually cries there is no dyspnœa. During yawning and suckling there is no cessation. An interesting point to observe in these cases is that along with the stridor there is an absence of cyanosis and of general distress, the infant being apparently comfortable and well. There is, however, indrawing of the chest-wall and of the episternal notch during inspiration, sometimes to a marked degree, but even with this the alæ nasi move very little. The child's cry, as a rule, is perfectly clear, long, and loud. Save for the presence of more or less indigestion, the general health is excellent, and there is an absence of the signs of rickets. As regards the ultimate course of the affection, it tends to terminate spontaneously after a period of time varying from a few months to a year and a half; as improvement goes on the intervals become longer and the noise less loud. Such is the clinical picture drawn from Thomson's carefully reported cases. Thus far I have made no reference to the condition of the throat and larynx in these cases, because the consideration of this point will be more fittingly discussed under the etiology and pathology.

---

[1] Transactions of Pathological Society of London, vol. xxxiv. p. 19.

[2] St Bartholomew's Hospital Reports, xx. p. 15.

[3] Goodhart's Diseases of Children, 1885, p. 251.

[4] British Medical Journal, 1890, vol. i. p. 607.

[5] Allgemeine Wiener medicinische Zeitung, 1890, No. 49.

[6] Journal of Laryngology, London, October, 1891.

[7] Edinburgh Medical Journal, September, 1892.

Etiology and Pathology. While there is general agreement expressed with regard to the symptoms and general course of this affection, we do not find the same unanimity upon the question of its etiology—a question which at the present time can hardly be said to have been solved. Different views regarding the mechanism of the production of the stridor have been advanced, and it is mainly with the object of examining these views and the reasons which have led to them that this subject has been introduced here. In the first instance, we may consider the question of the central origin of the affection—a view which has its supporters. Thomson[1] regards the obstruction as due to spasmodic muscular contraction dependent upon a central functional disorder, consisting in a slight disturbance of the co-ordination which normally takes place between the thoracic muscles on the one hand and those of the larynx on the other. The fact that the sound persists when the nostrils are closed, and equally so when the mouth is occluded during suckling and when the tongue is depressed by the spatula, points to its origin in the larynx and not in some other part of the upper respiratory tract. The irritable weakness of the central arrangement controlling the respiratory movements may be the result of backward development and might be looked upon, therefore, as of the nature of a developmental neurosis. Stamm,[2] of Hamburg, writing much more recently upon the same subject, expresses a somewhat similar view to that of Thomson. He considers it quite a plausible explanation that the condition is a func-

[1] Op. cit.

[2] Münchener medicinische Wochenschrift, September 20, 1898, and Annales de Médecine Chirurgie infantiles, January 15, 1899.

tional affection of central origin, of the nature of an arrested development of certain centres of co-ordination presiding over the movements of respiration. In support of this opinion he alludes to the not infrequent occurrence of a similar laryngeal stridor in young children who are just coming out of chloroform anæsthesia—an argument which Thomson also puts forward when commenting upon the probability of the existence of a spasmodic muscular contraction in the larynx as the obstructive lesion. The tendency to a spontaneous cure as the infant grows older and stronger also supports the hypothesis enunciated by these authorities. The case which supplied Stamm with his text resembled in almost every respect those recorded by Thomson, and after the administration of cod-liver oil and phosphorus for a period of six weeks the respirations became perfectly free.

Variot,[1] of Paris, was at first inclined to the view held by Thomson, and considered the stridor to be due to an abnormal glottic spasm. In the first case reported by him the larynx was intubated; during the act the child had an exacerbation, but from the moment that the tube was in place the stridor ceased, the respiratory movements became regular, and the indrawing of the chest disappeared. After the removal of the tube the stridor did not immediately reappear, but after a lapse of ten minutes the inspirations were again noisy and the condition returned as before.

More recently, however, the question has again been opened by Variot,[2] and he has arrived at a different conclusion with regard to the possible pathology of this complaint. This leads me to now consider the writings of those men who are inclined to regard the affection as dependent upon a congenital malformation of the larynx. Although Variot's second case is not the first in chronological order, we may now glance at the facts connected with it. The clinical picture was much the same as that already described. As in the previous instance intubation was practised, but greater difficulty was experienced in inserting the tube, and it was ejected two minutes after its introduction. During that short period the stridor appeared to be diminished in intensity, but not altogether suppressed. A second intubation was carried out, and when the upper part of the larynx was explored with the finger it appeared as if the epiglottis had fallen down upon the opening of the tube; nevertheless, the child breathed well and the wheezing noise at this time ceased to be heard, thus supporting the view previously held, that the cause of the symptom lay in a spasmodic contraction of the glottis. At a later date the child died of scarlet fever, and an autopsy was made. There were no enlarged glands in the thorax and neck, nor along the course of the recurrent laryngeal nerves; the thymus gland was of quite insignificant size. The upper aperture of the larynx, however, was considerably narrowed, as the aryepiglottic folds, instead of presenting the usual V-shaped opening between their margins, lay in close contact. These folds were thin and pliable and perfectly smooth on the surface. When the folds were moved aside the vocal cords were seen to lie in their usual position; they were white in color and otherwise apparently normal. The fibro-cartilage of the epiglottis was much curled upon itself. Variot points out that it is difficult to estimate the exact state of the vocal cords during life, as they are concealed by the malformations above them. He considers that the appearance of the larynx in this second case contributes to our knowledge of the pathology of this form of laryngeal stridor, and he suggests the use of the name "vestibular laryngeal stridor" as expressing more definitely the existing condition. In the case described by Lees[1] as far back as 1833, a very similar state of affairs was found at a post-mortem examination made on a similarly affected child who had died from diphtheria. The aryepiglottic folds, thin and not œdematous, lay in contact, while the epiglottis was folded upon itself and enclosed between its margins a small pin-hole aperture; between the arytenoid cartilages a second and rather larger opening existed. The vocal cords and the rest of the interior of the larynx appeared to be healthy. The clinical symptoms resembled those already described, while a laryngoscopic examination made during life revealed a condition resembling what was met with at the autopsy.

---

[1] Journal de clinique et de therapeutique infantiles, Paris, June 15, 1896.

[2] Ibid., June 19, 1898.

Harkon Refslund[2] describes a larynx very similar to the others; the epiglottis was so bent upon itself that the posterior surfaces of the two wings lay in contact, while the entrance to the larynx was narrowed to the size and shape of a small rhombic opening. Between the arytenoid cartilages, too, only a small fissure existed. This narrowing of the superior aperture of the larynx was visible with the mirror during life.

A very complete account of congenital laryngeal obstruction appears from the pen of Sutherland and Lambert Lack,[3] of London, based upon the examination of eighteen well-marked cases. These observers also favor the view, indeed, they are convinced that the affection depends upon a valvular action of the upper aperture of the larynx—a falling in of its lateral walls during inspiration. This depends partly upon a peculiar congenital malformation of the larynx and partly on the flaccidity of these parts in infants. They specially point out, however, that without the associated valvular action of the laryngeal aperture the malformation would not be sufficient to produce obstruction. As the child grows the malformation remains, but the stridor passes off because the parts forming the superior laryngeal aperture become less yielding. When examined with the mirror the epiglottis was found to be sharply folded upon itself, the two lateral folds in some cases being actually in contact; the aryepiglottic folds were also approximated, so that the upper aperture of the larynx was reduced to a long, narrow slit. Owing to the flaccid nature of the folds they flapped to and fro during respiration. In only a few of their cases, however, was a view of the vocal cords obtained.

---

[1] Op. cit.

[2] Münchener medicinische Wochenschrift, December 1, 1896, No. 48.

[3] Lancet, September 11, 1897.

So far I have given a brief account of the main facts connected with this interesting malady, putting forward two of the views which are held regarding its etiology and pathology. It has been suggested that the laryngeal appearances just described may be the result of the constant labored breathing and not the cause of it—that is to say, that owing to the presence of a spasmodic muscular contraction in the larynx, necessitating greater exertion during the inspiratory act, the flaccid and more mobile parts constituting the upper boundaries of the larynx are sucked in and assume the position already described. If this were so, then the two explanations, each of which has found its supporters, might, when taken together, satisfactorily elucidate the cause of this peculiar stridor in infants.

A third explanation has found favor among certain clinicians. Robertson,[1] of Newcastle, put forward the hypothesis that the affection consisted in a paralysis of the postici muscles of the larynx, induced reflexly by the presence of post-nasal adenoid growths. The possibility of the condition being a reflex one set up by adenoid vegetations has been discussed by various observers who have sought to elucidate the subject, and especially by Eustace Smith,[2] of London, who draws attention to certain cases in support of his views. He has recently reported[3] a case of laryngeal croaking which was cured after the removal of these growths. In it he describes a spasmodic contraction of the aryepiglottic folds due to irritation reflexly caused by the adenoids. After operation all the symptoms disappeared. Boulai[4] relates the case of a child who suffered from almost continuous difficulty of respiration, culminating at intervals, especially during the night, in violent attacks of laryngeal spasm. The paroxysms began abruptly a month after an attack of diphtheria for which it had been necessary to perform tracheotomy. The larynx appeared normal on examination, but during inspiration the epiglottis became curled like the letter V, the two halves almost meeting and closing the aperture. A fair quantity of post-nasal adenoid vegetations existed, and it was interesting to note that after exploration of the nasopharynx with the finger the spasms diminished for fifteen days. After the adenoids had been entirely removed there was complete cessation of the spasms, the breathing became normal in character, and no relapse followed. Lambert Lack joins issue with Eustace Smith in regard to his explanation of this respiratory phenomenon, maintaining that we have to deal with two classes of cases. Such cases as those described by Smith, Boulai and others are in a class *per se*, and differ from those recorded by Thomson and himself. Such a view is based upon the fact that there is cessation of the spasm under chloroform; that it is increased during sleep or after closing the mouth, and, further, that the patient is subject to severe suffocative attacks. In congenital laryngeal stridor, the condition referred to and described at the beginning of this section, we find the opposite conditions, the stridor persisting during suckling and chloroform anæsthesia, never aggravated during sleep, while the child remains free from suffocative attacks.

---

[1] Journal of Laryngology, October, 1891.

[2] Lancet, May 25, 1895.

[3] Ibid., March 19, 1898.

[4] Archives de Laryngologie, November and December, 1898.

Without wishing at this time to express any criticism upon the opinions of different authorities with regard to the possible etiology of infantile respiratory spasm, I would merely emphasize the fact, which few will probably take exception to, that undoubtedly two classes of cases do exist; most observers must have met with cases having symptoms resembling Boulai's cured by similar operative interference. The clinical picture which Thomson has given us, however, is a very different one.

We are now brought to the consideration of a fourth factor which has been put forward as the possible cause of the infantile respiratory spasm. I refer to the presence of an enlarged thymus gland pressing upon the trachea and causing narrowing of that tube. The question of thymus pressure upon the trachea is not a new one, and it is dealt with at some length in medical literature, but it has recently come to the front in connection with the subject which we are now discussing. Avellis,[1] of Frankfort-on-Main, is in favor of the view that tracheal stenosis must be sought for in the cases of typical infantile inspiratory stridor. This author has had opportunities for observing several infants whose symptoms were more or less identical with those previously described. As the result of an autopsy performed upon a boy aged four years, who had died in consequence of sudden and severe dyspnœa, and in whom the thymus gland was found enlarged, it occurred to Avellis that possibly the inspiratory stridor of infants might be due to a similar cause. Though apparently possesing no actual proof that such a condition existed in the cases observed by himself, he seeks to prove his hypothesis from the experience of others. In a boy under the care of Moritz Schmidt, difficulty of breathing, with occasional attacks of cyanosis and dyspnœa, had existed for five weeks. Tracheotomy gave no relief, but the introduction into the trachea of a long canula produced the desired effect. The mediastinum was afterward opened by Rehn and the thymus gland drawn forward and stitched to the fascia over the sternum. After this operation the child was relieved. Other cases of a similar nature are quoted by Avellis, and in addition to the proof thus furnished him by these operations, he obtains additional support to his hypothesis from the following chief factors, namely, the fact that the condition occurs in infancy and may be congenital, the tendency to a spontaneous cure in the second year of life, the tendency to improvement when the position of the body is changed, and the normal state of the larynx and its high position in the neck. In none of the children that were observed by him was there any evidence to show that the bronchial glands were enlarged.

---

[1] Archives für Laryngologie, Berlin, 1898, Band viii., Heft 2.

Before expressing any opinion upon Avellis' view we must turn for a moment to note the description of one or two further cases of tracheal pressure due to the thymus gland. Rabé[1] reports the case of a child who was admitted to the hospital suffering from certain digestive disorders. Later there was a sudden onset of grave respiratory trouble, but with no affection of the voice ; the larynx was normal. After a paroxysm of dyspnœa the child died asphyxiated. On post-mortem examination a large hypertrophied thymus weighing thirty grammes was found. Barnett[2] describes the condition of an infant who, shortly after birth, began to suffer from attacks of "grunting" and became cyanosed ; there were subcostal and suprasternal recession, and during the attacks cyanosis became marked. Laryngeal excursions existed. Tracheotomy apparently lessened the attacks, but three weeks after the operation there were marked dyspnœa, cyanosis, and death. The autopsy revealed an enlarged thymus producing considerable tracheal stenosis. Lange[3] also reports a case of tracheal compression from an enlarged thymus in an infant of four months ; cyanosis was a feature that accompanied the spasms. Purrucker[4] reports another case. In the few cases referred to here, one point of special interest is at once apparent, and that is the presence of cyanosis and the frequent existence of undoubted respiratory distress. In the typical infantile respiratory spasm, special stress is laid on the fact that cyanosis is absent and that the infant rests quietly and undisturbed. In the face of such striking differences as these it seems difficult to reconcile the hypothesis of Avellis with the actual clinical facts observed even in his own cases. In a brief sketch of this kind it is not easy to do full justice to all the points under consideration, but enough has been said to bring forward the different views that are held on this subject and to indicate that there is room for further investigation.

---

[1] Bulletin de la Société anatomicale de Paris, November and December, 1897.

[2] Lancet, April 30, 1898.

[3] Münchener medicinische Wochenschrift, 1899, No. 3.

[4] Ibid. No. 28.

OTOLOGY.

BY ROBERT L. RANDOLPH, M.D.

PHYSIOLOGY.

The Functions of the Stapedius Muscle. Usually the tensor tympani muscle has claimed our chief interest in matters pertaining to the functions of the internal ear-muscles. Observations upon the functions of the other ear-muscles are very scant, but the tensor tympani has formed the theme of many a dissertation, notably by Hensen, Bockendahl, Brüeke, and Ostmann. On the chief points of interest as to the functions of this muscle these observers agree, as do aural surgeons generally, and it seems established that it is the protecting muscle of the ear. As I have said, little has been done with reference to the functions of the stapedius muscle. We have been taught that the contraction of this muscle drives the posterior margin of the foot-plate further into the vestibule. It lifts the anterior margin further out from the vestibule, and it brings the head of the ossicle into closer contact with the end of the long process of the anvil. It cannot be said that recent observations have served to change our views. It has been shown by experiment[1] that the stapedius muscle in the dog makes a quick movement in the first moment of reflex listening, and there is no doubt but that this movement is for the purpose of putting the membrane in the most favorable position for the reception of sound, and that by lessening intralabyrinthian pressure it makes it easier for the labyrinth to receive sound vibrations—in other words, the contraction of this muscle tends to facilitate the transmission of sound to the labyrinth. It may well be regarded as the accommodative muscle of the ear.

From a number of observations made on deaf persons with the continuous tone series, Ostmann has advanced the opinion that when the tuning-fork is no longer heard in front of the ear it may again be appreciated for a moment by the action of the stapedius muscle.

THE EXTERNAL EAR.

Boils. TREATMENT. We have not yet found a remedy which gives entire satisfaction in treating boils in the external auditory canal. The yellow oxide of mercury ointment, salicylic acid ointment, and the other usual remedies leave much to be desired, and we often find this condition of the external auditory canal just as obstinate to treat as are boils elsewhere. One would think from the very limited area involved that we should soon be masters of the situation, but this is often not the case, and boil after boil will appear in spite of our efforts to disinfect the canal. The treatment which is usually regarded as most efficacious consists in scouring and cleansing the skin of the canal and auricle with soapsuds, following this with an irrigation of ether and alcohol. Vidal and Brocq employ for cleansing purposes saturated solutions of boric acid in alcohol. In the early stage of the boil the application of the galvano-cautery has been known to put a stop to its progress. Later on warm sublimate cataplasms, 1 : 4000, are highly recommended, though I have never tried them. When the furuncle has burst it is very important that the surrounding parts be kept aseptic, and this is best done by keeping them covered with finely powdered boric acid. For the pain, irrigations of hot water (sterilized) are probably more efficacious than anything else. It is well to cleanse the skin once or twice daily with solutions of boric acid in alcohol. Finally, it is wise to adopt constitutional as well as local treatment.

---

[1] Ostmann, Archiv für Anatomie und Physiologie, Band v. und vi., Heft 28.

A year ago it will be remembered that Haug, of Munich, advocated the use of alcohol in treating boils in the auditory canal. I have tried the treatment not only as an abortive measure, but also, as the author has directed, even when the abscess has gotten a start, and while I am not prepared to speak positively about the value of the treatment, I must confess to a feeling of disappointment. Haug's treatment consists in introducing into the external auditory canal strips of gauze soaked in alcohol, the strips being changed every few hours.

Recently, Lamann, of St. Petersburg,[1] has brought to our notice the "tampon treatment" of this affection. He has used all methods, and, finally, to use his own words: "I have been obliged to pilot my boat back into the quiet harbor of the zinc tampon treatment." He speaks to his patients with great confidence, and assures them relief in two or three days. He insists upon the tampon remaining in the ear for twenty-four hours before it is removed, and under no condition allows it to be touched. Frequently the pain is quite severe during the twenty-four hours, especially at night, and even the second night it may be present, although after this time it invariably ameliorates. It is a great temptation to remove the tampon, and if this is done relief will follow, it is true, but soon the pain returns with increased severity; therefore, to use Lamann's own words, "Understand, don't touch." The ear is first syringed out with either lysol or creolin, and the tampon is then introduced. It is well to have a sound, the point of which is shaped like the worm of a screw, with a diameter of a little over 1 mm. Around this the cotton is wrapped, and in this manner the tampon is shaped. It should be cylindrical in shape throughout, and by no means pointed. The greater the narrowing of the canal the tighter the cotton must be wrapped, for the pressure upon the boil must be the greater. As the swelling subsides the tampon becomes loose, and when all the swelling has disappeared the tampon will exert very slight pressure. Before introducing the tampon it should be thoroughly saturated with the ointment. The tampon is then covered with the salve and held over a flame, and as the salve melts it is taken up by the upper layer of the cotton. This process is repeated at least three times. It seems to me that this is a very important point, for were only the surface of the tampon covered with the ointment the latter would soon melt with the temperature of the skin and pass into the deeper layers of the cotton, leaving a comparatively dry surface next to the walls of the canal.

---

[1] Monatsschrift für Ohrenheilkunde, February, 1889.

We know that not infrequently the bony part of the canal participates in the process and becomes very much narrowed. Anticipating this contingency, Lamann insists that the tampon be carried all the way to the drum membrane. It is evident that the idea is to allow the furuncle no room for play, so the tampon must be made sufficiently large to exercise decided pressure upon all sides of the canal. The pressure then is the principal thing. According to Lamann the process under this treatment will in 90 per cent. of cases get better in two days, and it will be seen that the effect of the first tampon will be to set a boundary to the process, and that from this time the boil will decline. The author lays great emphasis upon the importance of keeping up the tampon treatment till the canal has taken on its normal color. We know the great tendency to relapses in this affection, and it seems to me that this is also an important point. For years I have been in the habit of using tents or tampons of cotton soaked in an ointment, either the yellow oxide of mercury or salicylic acid, and with this treatment I have cured a number of cases. It did not occur to me, however, that any of the good which resulted was due to the pressure exercised upon the walls of the canal, or rather upon the furuncle. Keeping this idea in view it will be easy in the future to construct tampons which fulfil the required conditions.

After the suppuration has ceased the tamponing may be left to the patient, and a tampon should be introduced twice daily. I do not think that the zinc ointment has any special advantage over either of the other two ointments which I have mentioned.

New Local Anæsthetic for Operations upon the External Auditory Canal. In connection with the subject of boils in this location, I may mention a new method of anæsthetizing the external auditory canal preparatory to opening an abscess. The suggestion comes from Dr. A. Bonain, a surgeon of Brest.[1] He mixes muriate of cocaine, menthol, and pure carbolic acid in equal proportions. This is applied, several minutes before the operation, to the tissue to be excised, and Bonain claims that the operation is rendered absolutely painless. The technique consists in introducing a small tampon soaked in the mixture into the canal, and leaving it in position for ten minutes. Bonain also recommends this agent, which he calls mentho-phenol-cocaine, as valuable in relieving the pain of furunculosis in those cases where an operation is not immediately indicated.

Menstruation from the Ear. Mention may here be made of an interesting phenomenon which has been very seldom observed, namely, vicarious menstruation from the external auditory canal. A case is reported by Lermoyez,[2] and is that of a girl, fourteen years old, who regularly every month had a sanguineous flow from the right ear, accompanied by constitutional symptoms common to the menstrual epoch. The flow lasted five or six days, and the discharge was of precisely the same character as that which comes from the genitals at this time. The ear, with its surroundings, was absolutely normal with the exception of multiple varicosities on the osseous wall. The left ear was also normal, though presenting the same varicosities in the osseous part of the canal. There had never been any discharge from the left ear. This condition of affairs kept up for three years, when the genital menstruation commenced.

Gruber has said that a hemorrhage from the ear means a lesion of the drum membrane, but the case reported by Lermoyez certainly gives the lie to this law. An analysis of the history points to the external auditory canal as the source of the hemorrhage. According to Baratoux the flow probably proceeds from the orifices of the ceruminous glands. It is no unusual thing to see a hemorrhage from the ear in the course of a suppurative inflammation of the middle ear, and this latter condition may be regarded as almost the invariable cause of such hemorrhages. Lermoyez, however, throws no light upon the probable etiology of this condition in his case.

Otitis Externa Diffusa is a desquamation of the external auditory canal, and is sometimes so called. Where the entire canal is red, humid, and devoid of its epithelium, Gomperz has recommended the insufflation of *argonin* once or twice daily.

---

[1] Revue Hebdomadaire de Laryngologie d'Otologie et de Rhinologie, June 17, 1899.

[2] Annales des Maladies de l'Oreille, du Larynx, etc., August, 1899.

Noma of the Auricle. A case of noma of the auricle, reported by M. Smith in the *British Medical Journal*, is, so far as I know, unique. The child was two years old. The cause of the trouble could not be discovered. A small gangrenous ulcer first appeared on the antihelix, and in six weeks, in spite of antiseptic applications and excision of the slough, the entire auricle became gangrenous. The process invaded the adjacent parts, and the child died of meningitis.

Plastic Operations on the Auricle. I have often been struck with the unsatisfactory results seen after plastic operations upon the auricle, more especially after operations for congenital deformities. Of course we now and then meet with deformities which we would do well to let alone, a fact, I think, which otologists realize more than does the general surgeon. I have now in mind several cases of congenital malformations of the auricle (chiefly of the cartilaginous part of the auricle), where operations by a general surgeon had the effect of making the condition more conspicuous, and both of which cases I had regarded as inoperable.

FIG. 34.

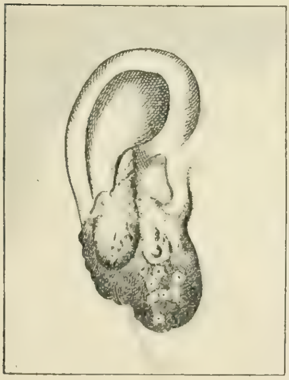


FIG. 35.

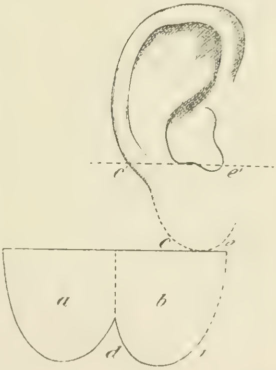
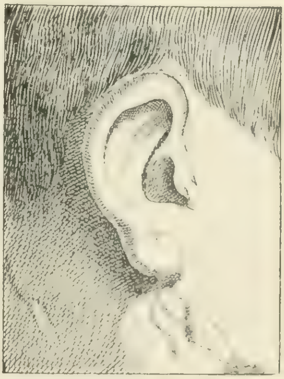


FIG. 36.



There are some conditions, however, in which plastic surgery has met with success. I refer to auricles which suggest in shape the auricles of some of the lower animals (either cats or dogs) or where the auricles are conspicuously large. Among acquired deformities of the auricle those which are confined to the lobule are probably the most frequent.

Generally, after operations for tumors located at this point, the deformity is more or less marked. In such cases, Gavello, of Turin,[1] has suggested the following procedure, one which he has followed with success in the case of a patient who had lost the entire lobule and a part of the concha after an operation for a tumor. (See Fig. 34). The first step consisted in getting a skin-flap from the region of the neck below the insertion of the auricle. The shape (Fig. 35) resembles that of a double lobule or rather of two triangles (*a b*). The flap should be so constructed that its edge will pass about one-third beyond the limits of the lobule, so as to allow for contraction. The pedicle (*e f*) is then applied to a line which marks the insertion of the neck below, and the flap is folded so that its two halves will lie against one another—that is, its bleeding surfaces will come together and the epidermis face will look outward. Interrupted sutures are then introduced to join the upper border of the flap to the under edge of the bleeding auricle. The lower edges of the new lobule are secured by a suture. The space from which the flap was obtained is closed by a piece of skin with the pedicle directed downward. The result of the operation is seen in Fig. 36.

---

[1] Annales des Maladies de l'Oreille, du Larynx, etc., March, 1899.

Foreign Bodies in the External Auditory Canal. Fortunately the cases are rare in which we have to displace the auricle forward for the removal of a foreign body from the external auditory canal. Schwartze, in Germany, and J. Orne Green and St. John Roosa, in this country, are the pioneers in this operation. Such an operation should be resorted to only after all other methods have failed. Cases which come to us with foreign bodies in the canal, and which have been tampered with by unskilled hands, are usually the ones which demand this radical operation. No one but an expert should attempt the instrumental removal of a foreign body from this location. He who is not an expert should begin and end his attempts with the syringe. I have seen more than one case where either a cherry-stone or a button was driven into the drum membrane through clumsy attempts at extraction, and where, as a result, the canal was so much swollen as to hide the foreign body. As I have said, however, such cases are rare, and only a few, where the radical operation was demanded, have been reported in this country.

Kauffmann, of Vienna,[1] has recently reported a case of this character. The patient was a child, aged thirteen years, who had introduced a lead-pencil into the ear. The metallic end had become detached and remained behind in the canal. For two hours efforts had been made to extract the foreign particle, but the only result was to force it further down the canal. The child fell into Kauffmann's hands on the third day, and at this time there was great tumefaction of the canal, with a bloody discharge. Cocaine and a bandage were applied, and it was decided to wait until the swelling had subsided. This treatment was kept up for a week, but the secretion became more abundant and the skin more tumefied. The child was anæsthetized, and the auricle was detached and separated at the end of the membranous part of the canal, but no foreign body was brought to light. The cortex was then opened, and the mastoid cells were found filled with pus. The mastoid process was trephined and a part of the osseous wall of the canal was removed, and only then could the foreign body be seen, and, at this point, readily extracted. The child made an uneventful recovery, the membrane healing over and the hearing becoming good ultimately.

---

[1] Revue Hebdomadaire de Laryngologie, etc., September 10, 1899.

Gruber in these cases has long advocated not only separation of the soft tissues of the external auditory canal, but even removing the bony substance at the border of the posterior wall of the canal and, if necessary, down as far as the tympanic cavity.

LARVÆ IN THE EXTERNAL AUDITORY CANAL. We all know that in cases of otorrhœa of long standing living maggots are occasionally found not only in the external auditory canal, but even in the tympanic cavity. The explanation is easy. Such cases have been reported by Blake, Buck, and others. The fly is attracted to the meatus by the discharge, lays her eggs at this point, and soon larvæ appear. Lannois[1] reports a very unusual case where larvæ were found in the external auditory canal without any otorrhœa. The patient was a man, fifty-one years of age, who had been suffering for several days with intense pain in the ear and all over the lower jaw. He went to a druggist who washed out the ear and removed about fifty small maggots. As the pain did not abate he consulted Lannois, who found the canal full of maggots. These were removed, and relief was immediate and permanent. The man had several decayed teeth, in consequence of which his breath was very fetid, and this, Lannois supposed, attracted the fly. This explanation seems to me rather far-fetched when we consider how common are decayed teeth and how rare the condition which is described by Lannois.

Exostoses of the External Auditory Canal. In a large proportion of cases of exostoses of the external auditory canal no exciting cause can be found. There are two conditions which are generally regarded as justifying operative interference: First, if there is deafness in one ear and the growth of an exostosis in the good ear is gradually depriving the patient of hearing. Second, in those cases of chronic inflammation of the middle ear where the exostosis by closing up the canal prevents the escape of pus. Noquet, of Lille,[2] reported a short time ago three cases which came under his observation and which presented some especial points of interest. In the first two cases the tumors were bilateral, and in both of them the tumor in one ear, as regards size, shape, and location, was exactly similar to the tumor in the fellow ear. This is not the rule. Noquet employed catheterization in these cases, and was struck by the beneficial influence exerted by this treatment—a fact which shows that a chronic middle-ear catarrh is usually present. The stationary character of exostoses in this location has been noted by others, and Noquet failed to observe any increase in size in one case during a period extending over ten years, and in the other case during eight years.

---

[1] Revue Hebdomadaire de Laryngologie, d'Otologie, etc., September 30, 1899.

[2] Ibid., August 26, 1899.

TREATMENT. Toynbee and Wreden paint these growths with tincture of iodine, but this treatment failed absolutely in the only case of exostosis which I have treated. According to Politzer and Noquet, such measures should be rejected as dangerous, as they may set up serious inflammation of the canal, and by spreading to the drum membrane may involve the middle ear and finally lead to the retention of pus with all its direful consequences.

A few years ago a young man, aged thirty years, came to me with an exostosis which completely filled the left external auditory canal. It sprang from the anterior wall of the canal and bridged the latter completely. It had a broad base and was somewhat cone-shaped. The treatment consisted in applying to the centre of the growth nitrate of silver fused on the end of a probe. I soon had a hole in the exostosis, which hole grew deeper after every application. Twice I allowed an interval of a week to elapse between applications, as there had been slight reaction following the last application. The patient irrigated his ear twice daily with a warm boric acid solution, and in this way washed away all the broken-down tissue. Treating it in this manner for several weeks, and always suspending the silver at the slightest suggestion of inflammatory reaction, I succeeded in perforating the growth. That part jutting up against the posterior wall was easily undermined, subsequently broken off, and was removed with a pair of forceps. The base was then attacked, and treated in the same gradual manner till the canal was open enough to see the entire drum membrane. The chief points about the treatment (which lasted three months in this case) are to touch only the growth and to make haste slowly.

Tumors of the Auricle. These are very rare. Among some recent statistics of Carl Senff I note that only thirty-four tumors of the auricle were found in 71,450 cases of ear disease. Sarcoma of the auricle is particularly rare, and there are probably hardly a dozen cases to be found in literature. Sugar[1] reports a case of melanotic giant-celled sarcoma of alveolar structure. The case seems to be a unique one, for I can find no analogous one in literature. The tumor was made up of multiple nodules which were scattered all over the auricle. There were glandular enlargements in the inferior maxillary region and also in the region of the neck. The growth had been treated for some time with acetic acid, and a portion of it had been excised, but after both procedures it had promptly returned. Later the auricle was removed and also the cartilaginous part of the canal, and the diagnosis was confirmed by a microscopic examination. The patient died some months later with phlebitis, and it was shown from an examination of his internal organs that no metastases from the sarcoma were present. But for his having succumbed to an intermittent affection the operation would probably have given him a long life. The rarity of the case and the successful eradication of the growth makes this report an exceptionally interesting one. We all know the malignity of these tumors and their liability not only to local recurrence but also to metastases.

---

[1] Archiv für Ohrenheilkunde, Band xlvii., Heft 2.

THE MIDDLE EAR.

Sclerosis of the Middle Ear. TREATMENT. It is seldom that we find an aural surgeon taking such a hopeful view of the prognosis as do Faraci and Ferreri. For a year or two after Kessel suggested stapedectomy for the relief of this condition, or rather for the distressing tinnitus which accompanies it, we thought we had found in this operation the long hoped-for remedy, but it soon became evident that the operation is indicated in only a small group of cases, and inasmuch as the condition of many of those who were operated upon was aggravated, stapedectomy has for some time had a bad name. Ferreri,[1] of Rome, still thinks the operation has a big field of usefulness, but he would not resort to it until other measures had been tried for a time. He seems to think very highly of intratympanic injections in this class of cases, and gives it as his opinion that the reason why we do not oftener get good results from this procedure is because the injections are either made with too great violence or too frequently. Where the trouble is in its incipiency and the patients are young and robust, it is well to try the action of thyroid extract, of which thirty centigrammes should be taken once or twice daily. It may be remembered that Rossi has suggested intratympanic injections of jequirity. An indication which should decide us to operate at once is the appearance of rapidly progressive symptoms of the same trouble in the other ear. Urbantschitsch first called attention to the favorable influence that the operation has upon the hearing of the other ear, and Ferreri has been able to confirm this observation in several instances. I am disposed to agree with Ferreri in thinking that the so-called middle-ear sclerosis is not a disease limited entirely to the middle ear, but that it is a chronic trophoneurosis of the mucous membrane of the tympanic cavity coinciding often with analogous changes in the labyrinth, and, indeed, the entire nasopharyngeal region.

---

[1] Annales des Maladies de l'Oreille, du Larynx, etc., April, 1899.

According to Ferreri the cases which are peculiarly adapted to either stapedectomy or ossiculectomy are the adhesive forms of middle-ear sclerosis, where the examination shows that there is either some hinderance to the movements of the drum membrane or that the movements of this membrane are completely abolished. An operation is apt to be beneficial where the vertigo and false hearing as well as the actual deafness are sources of great suffering to the patients.

It may be said here that Urbantschitsch was the first to report cases where these symptoms were dissipated by extraction of the hammer and anvil. Unfortunately as regards stapedectomy the results reported by Ferreri would not form a strong argument in favor of this operation, for one would not infer from his remarks on the subject that his experience had been very extensive. I might say in this connection that Politzer advises the operation in cases where the fixation and rigidity of the bone are to be attributed to adhesions following chronic suppurative inflammation of the middle ear, and where the labyrinth and its capsule have been spared.

FALSE HEARING. This symptom, which has been alluded to several times in speaking of middle-ear sclerosis, has been made the subject of discussion at a recent meeting of the Austrian Otological Society,[1] where such men as Politzer, Gruber, and Urbantschitsch expressed themselves on the subject. Alt is of the opinion that the symptom means not only middle-ear trouble, but also an involvement of the labyrinth. In this opinion he is supported by Urbantschitsch. Politzer thinks that the symptom in many cases is of purely nervous origin, especially where there is a history of traumatism. In my experience the condition is certainly rare. Gruber accounts for the rarity of the symptom on the supposition that it would be noticeable only in patients who had a good ear for music. This sounds reasonable. The cases observed by Gruber for the most part had a history of traumatism, and from his remarks I am inclined to think he rather agreed with the conclusions of Politzer.

Anæsthesia in Middle-ear Operations. Bonain has recommended the use of a mixture containing equal parts of menthol, cocaine, and phenol, which I spoke of when on the subject of furunculosis. He has used this solution in operations where it was necessary to break up old adhesions, in mobilization and extraction of the ossicles, and in complete operations for the removal of the drum membrane. When the latter is intact the solution is applied to the membrane for about five minutes, it is then incised and a few drops of the solution are instilled behind it. Cocaine should be the solution instilled, and it should always be tepid. According to Bonain the anæsthesia is perfect, and in a large number of cases he has never had any septic complication.

---

[1] Monatsschrift für Ohrenheilkunde, February, 1899.

Myringitis Sicca. Inflammation of the drum membrane is a comparatively rare affection—that is, the primary form. As commonly seen it is secondary to an inflammation of either the middle or of the external ear. The chronic or dry form (myringitis sicca) finds little notice in the text-books, and yet Stetter[1] in the past nine years has observed this affection in 5 per cent. of his cases. The most prominent symptoms of myringitis are the desquamation from the walls of the canal and the transformation of the membrane into a thickened granulating surface. A fetid secretion is always present in the canal. These are the most conspicuous objective symptoms of the variety of myringitis which is described in the text-books. While desquamation may be present in the dry form, it is an inconspicuous symptom. The membrane is cloudy, while Shrapnell's membrane and the vessel which passes along the malleus handle are injected. As a rule, the light reflex shows but slight change, though it sometimes seems a little broader. The hearing diminishes very gradually, and the patient is hardly conscious of it until by chance he discovers that hearing in the affected ear is not what it should be. One of the most common complaints is the inability to understand ordinary conversation, especially if several people are talking.

I need not dwell upon the points of difference between this disease and middle-ear sclerosis on the one hand, and chronic dry catarrh of the middle ear on the other. It might be said, though, that in these last two diseases tinnitus, rapid decline in hearing, retraction of the drum membrane, and marked clouding of the latter behind the malleus handle are, as a rule, present, while they are absent in myringitis chronica sicca. According to Stetter, hearing is never entirely lost.

TREATMENT consists in applications to the drum membrane and mechanical treatment of the latter by passive movements of the ossicles. The medicinal treatment consists in dropping into the ear twice daily a mixture, the most important element of which is sozoiodol acid. This remedy has great powers of resorption. The formula employed is :

℞.—Sozoiodol acid	0.5
Absolute alcohol	2.0
Castor oil	20.0

This treatment should be kept up for three weeks, and it will be noticed at the end of this time, when the Siegel otoscope is used, that the membranes show greater movability than formerly. After this, massage of the drum membrane should be taken up. Stetter has gotten the best results with electrical massage in the manner described by Breitung.

---

[1] Monatsschrift für Ohrenheilkunde, March, 1899.

Electro-massage. Breitung[1] describes his method, and mentions the character of cases to which its use is especially adapted. In practically all cases of progressive deafness his method of electro-massage has been used successfully by Beckmann, Thies, Noltenius, and others. The objection which some have made to the treatment—namely, that the current is not easily controlled—is met by Breitung with the very simple statement that the appearance of the malleus handle will always be a reliable guide as to the proper strength and duration of the current. Just as soon as we see injection of the malleus vessels the current is to be turned off. He commends the method as pre-eminently successful in treating subjective noises, and he refers to a number of cases of this character where the use of the electro-massage was instrumental in giving relief for hours at least, where all other agencies had failed.

Politzer is opposed to Breitung's treatment in those forms of middle-ear catarrh where there is anchylosis of the stapes, but Breitung thinks that the diagnosis of anchylosis is enveloped in too much mystery to justify any such hard-and-fast rule, and that the effect of his method of treatment should be the best indication as to whether it should be continued, irrespective of the character of the complaint. I am inclined to agree with him as regards the diagnosis of anchylosis of the stapes, and even were the diagnosis certain I hardly think the objections of Politzer insuperable. Breitung also speaks highly of the use of the sozoiodol acid as suggested by Stetter. In speaking of his own electro-massage Breitung does not claim to have ever brought back the hearing to the normal, but many times he has enabled his patients to once more follow pursuits and participate in pleasures from which their defective hearing had long excluded them. The theoretical needs of a case should not be our guide in deciding whether or not to use the method. It should be tried in all cases.

The Pneumatic Cabinet in the Treatment of Catarrhal Deafness. This method of treatment has been successfully tried for several years past by Hovent, of Brussels. He reports having treated, between 1893 and 1896, 138 persons, many of whom had been treated in various parts of the Continent, and five of whom had been pronounced incurable. The result of his treatment was restoration to hearing of 35 per cent. The action of the increased atmospheric pressure is to empty the veins and capillaries in the ear, which may have been in a condition of dilatation. In this way congestion of the vessels within the ear is relieved. Results more or less confirmatory of these have been reported by Levistein and others. Recently, von Leibig[2] has published some results which indicate that the method is certainly of value. The treatment has been highly recommended in hyperæmia of the labyrinth, where we are in the habit of giving such remedies as pilocarpine. In this connection Pravaz reports a case where a man who had been made very deaf from the explosion of a cannon was greatly helped by the pneumatic cabinet. Pravaz reminds us of the fact that pressure upon the carotids often alleviates tinnitus aurium, and in the same way under the influence of increased atmospheric pressure subjective noises will often disappear.

---

[1] Monatsschrift für Ohrenheilkunde, August, 1899.

[2] Münchener medicinische Wochenschrift, May 16, 1899.

Pneumomassage. C. H. Burnett, of Philadelphia, spoke upon the question of pneumomassage at the last meeting of the American Otological Society. He speaks of pneumomassage of the external auditory canal as compared with inflation of the tympanic cavity. He thinks that this method of treatment applied to the external auditory canal and membrana tympani, in both acute and chronic catarrhal processes of the middle ear, is more efficacious, less of a shock to the auditory nerve, more agreeable to the patient, and freer from the dangers of infection than is the case with tympanic inflation. He makes this rather singular statement: "Inflation of the tympanum being very rarely necessary as a means of forcing air into the middle ear, the latter being very seldom in need of it, it is fair to conclude that inflation as it must be applied to both ears, whether desired or not, is usually contraindicated in aural diseases." On the other hand, as drawing the malleus and membrana tympani outward, with traction on the tensor tympani and restoration of the normal isolation of the auditory ossicles, is desired without any shock to the structures upon the inner wall of the drum cavity, and as this can be so safely effected by pneumatic rarefaction of the air in the auditory canal, pneumomassage is indicated for this purpose. In Burnett's own practice some form of pneumomassage has almost entirely superseded for the past few years all forms of inflation of the drum cavity.

Intratympanic Injections. Simoni[1] reports a number of clinical observations made in the clinic of Professor Gradenigo. Fifteen cases of chronic aural catarrh were treated. A mixture of iodoform, oil, vaseline, and ether was injected. Improvement was noted, with the exception of those cases where there was undoubted middle-ear sclerosis, in every instance. The improvement showed itself particularly in the disappearance of the subjective noises. The cases were kept under observation for a considerable length of time, and the relief seemed permanent. It is not unlikely, however, that much of the good which resulted from this treatment might have resulted from the inflation of the tympanic cavity.

Effect of Atmospheric Changes on the Hearing in Chronic Aural Catarrh. Oppenheimer, of New York, has lately made this question the subject of some investigations. It is certainly one of practical importance, for very often we are asked by our patients where it would be safe for them to spend the summer, whether on the seashore or in the mountains, and I think it is pretty generally held that the hearing in cases of chronic middle-ear trouble is made worse by atmospheric changes.

---

[1] Archiv für Ohrenheilkunde, Band xlvi., Heft 3 and 4.

With a view of ascertaining the detrimental action of barometric and thermal changes upon the hearing in cases of chronic aural catarrh, fifty cases of this character were studied over a considerable period of time. It is well to call attention to the fact that the normal ear is uninfluenced by atmospheric changes, except in a very limited and insignificant degree. I shall simply give Oppenheimer's conclusions: 1. The hearing in at least 70 per cent. of cases of chronic catarrhal deafness becomes worse under adverse conditions. 2. The degree of impairment of audition as influenced by atmospheric changes is determined to a great extent by the location and character of the pathological process in the tympanic cavity. 3. The morbid alterations most susceptible to barometric variations are those of hyperplasia. 4. In purely atrophic changes in the middle ear weather variations have little or no effect upon hearing. 5. Atmospheric influences also impair hearing by unfavorably affecting catarrhal processes of the upper respiratory tract and Eustachian tube. 6. All things being equal, impaired hearing in case of chronic aural catarrh is diminished more in those whose general health is below par than in those otherwise healthy.

In connection with this subject mention should be made of a recent contribution by Körner, of Rostock, on the action of sea climate and of surf-bathing on aural affections.[1] His investigations were made at a children's hospital situated on the Baltic, where he made a close study of 144 cases. Marked retraction of the drum membrane was recorded in twenty-four cases on entrance, and in none of these cases was there any injurious effect noticed as a result of the sojourn at the seashore. In two cases the retraction has slightly increased. Cicatrices of the tympanum were present in seven cases, and in one of these cases a painless otorrhœa occurred. Dry perforation was noted in three cases on entrance, but no otorrhœa developed in any of these in spite of the fact that all three had bathed often, and one as often as thirty-three times. Tympanic suppuration was present in six cases on admission, and when these cases left the otorrhœa was present in only two. In one case the otorrhœa had ceased after seventeen warm baths, and in the other after twenty-three cold sea-baths. Perforation closed in two cases. In one case a marked opacity of the superficial layer of the drum membrane had been cleared after twenty-seven baths. Furuncles did not occur in any of the children who were bathing.

---

[1] Archives of Otology, vol. xxviii., Nos. 2 and 3.

Apropos of bathing for those who are affected with ear disease, I find another communication on the subject from Danziger, of Beuthen.[1] We know that Baginski has made a number of experiments to determine the effect of increased pressure in the tympanic cavity by injecting fluids into the latter, through the membrane, after the latter had been first ruptured. The resulting symptoms closely resembled those present in Ménière's disease. Lucae has shown that even where there is no rupture the same symptoms may result. The theory is that a wave is started which makes its way into the labyrinth through the aqueductus cochlea; from thence it goes into the cerebro-spinal fluid and its force is finally spent at the base of the brain.

Danziger relates the following case in point: The patient had a perforation in his right drum membrane and noticed when swimming on his back that suddenly the water rushed into his ear and he was seized with giddiness which compelled him to leave the bath at once. The sensation lasted for one or two days, when it disappeared after the use of the catheter. Danziger found the tympanic cavity full of water. The patient had driven the water into his ear by a movement of his arm, and the effect produced was similar to that often seen after syringing out the ear.

This communication is an important one, for it points to the wisdom of carefulness when bathing under such conditions—that is to say, with defects in the drum membrane. Sudden death while bathing is usually attributed to heart or brain trouble, but it is easy to see how such an accident as the above, by bringing on giddiness, may lead to death by drowning. Perforation is not a rare affection, and water, rushing into the external auditory canal while the patient was bathing, might easily cause increased pressure within the cavity. This is especially apt to occur when diving, and it is not unlikely that some of those who have failed to return to the surface after a dive may have been the victims of just such an accident. The importance, then, of warning persons affected with ear disease against diving cannot be overrated.

Catheterization. In this connection, Dionisio,[2] of Turin, makes the following suggestions. After introducing the catheter in the usual way the air is blown in with a rubber bag to see if the tube is permeable. As soon as the air penetrates the tympanic cavity Dionisio squeezes with his fingers the nose of the patient, and tells him to inhale vigorously, at the same time closing his mouth. In this way the air in the mouth is rarefied. During the movements of inhalation or of suction the opening of the tube adheres closely to the tip of the catheter, and the degree of penetration of the air into the drum cavity is augmented. This method prevents liquids from escaping from the catheter into the post-nasal region before reaching the drum cavity. Dionisio counsels against using too much pressure in these cases, as it is easy to produce emphysema.

---

[1] Monatsschrift für Ohrenheilkunde, September, 1899.

[2] Annales des Maladies du Larynx, etc., February, 1899.

Otitis Media Suppurativa. TREATMENT. There is no ear affection with which the general practitioner is oftener brought face to face than otorrhœa. Some of these cases will get well in a week or ten days simply by cleansing the ear once or twice daily with warm water; others require a longer time, and in the majority of cases the inflammation will subside without any direct measures being taken to arrest it. Sometimes we are confronted with cases which are more stubborn, in which the otorrhœa keeps up in spite of the most active and approved measures for its arrest. We all know that not to make any attempt to diminish or to arrest the discharge as long as there is pain is a safe rule.

When we meet cases which have failed to yield to our old friends, boric acid, nitrate of silver, and peroxide of hydrogen, we feel that we are left in the lurch. At this stage the use of formol has been suggested. Vacher,[1] of Orleans, strongly advocates the use of either 5 or 10 per cent. solutions of formol in the treatment of such cases. I must confess that the patients with whom I have used this agent have complained so bitterly of the pain following the irrigation that I have been obliged to forego its further use. I am well aware, however, of its valuable properties as a germicide, but like many other valuable germicides it is too irritating. Vacher admits that the irrigations are generally painful when the solution is stronger than 5 per cent. A solution of this strength is what he usually employs, and he generally uses as much as a litre at a time. The canal is then filled up with wadding or gauze which has been soaked in the same solution. In some cases it is necessary to repeat the irrigation every day, especially when the pus is very abundant and offensive. I am continually hearing of the good that formol is doing in this class of cases, and am disposed to give it more extended trial. It would seem to be wise, however, to thoroughly cocainize the ear before making the irrigation. Vacher thinks that this agent has no equal for removing the offensive odor so often seen in this class of cases.

Before speaking further of suppurative inflammation of the middle ear, a word as to the TREATMENT OF ACUTE INFLAMMATION OF THE MIDDLE EAR before the stage of perforation or otorrhœa has been reached. We know that such inflammations can be traced as a general thing to infection from the nasopharyngeal region. Earache and more or less deafness follow. The treatment should be directed not only to the ear, but to the nasopharynx, and even to the general condition. Irrigating the nasopharynx with a hot salt solution is an admirable way of cleansing this locality. After this the instillation into the ear of the following solution will be found helpful in subduing the pain :

---

[1] Annales des Maladies de l'Oreille, du Larynx, etc., January, 1899.

℞.—Cocainæ hydrochloratis	gr. xx.
Morphinæ sulphatis	gr. j.
Atropinæ sulphatis	gr. ij.
Aquæ destillatæ	℥ ss.

When this is done it has been suggested by Rohrer[1] that the meatus be closed with a small cotton tampon soaked in 10 per cent. mentholated oil. Rohrer then advises that either xeroform or dermatol be insufflated upon the nasal mucous membrane. I have made it a habit to mop out the pharynx with a 10 per cent. solution of nitrate of silver. It is well for the patient to remain quiet in his room, and if there is any elevation of temperature the following pill will be found most efficacious :

℞.—Phenacetinæ,		
Quininæ sulphatis	āā	grs. v.
Cocainæ hydrochloratis		gr. $\frac{1}{6}$.
Misce et fiant in pil. No. i.		

I have found this pill particularly valuable when the ear trouble is a complication of grippe. The treatment of the ear and nose should be repeated every day. At this stage I have usually inflated the drum cavity and always with the catheter, never with the Politzer bag. The air should be forced in very gently, and before this step is taken the nasopharynx should be thoroughly cleansed in order to avoid driving any infectious material up the Eustachian tube. Such are the measures I usually adopt in cases of acute inflammation of the middle ear, and I have often seen the inflammatory process disappear without having reached the stage of suppuration and perforation.

Syringing out an ear which is the seat of an inflammation of two or three days' standing is a very common habit, and a very bad one, too. S. MacCuen Smith[2] has recently emphasized this point in an article on acute inflammation of the tympanic cavity. Syringing of the ear should not be employed in acute suppuration of the middle ear unless there is some special reason for it. The discharge should be removed by cotton twisted on an applicator ; some peroxide of hydrogen should be instilled and allowed to remain in the ear four or five minutes, and the canal is then dried with cotton. A small strip of iodoform gauze is next put into the canal and a plug of cotton is placed exterior to the gauze to catch the discharge. This dressing should be renewed daily for a week, when the case will begin to improve. In cases where the discharge is very sticky and slimy, Stetter[1] has suggested the use of a 2 per cent. solution of iodide of potassium. This solution has the effect of taking away the sticky and slimy character of the discharge, which is often so tenacious as to be difficult to remove.

---

[1] Revue Hebdomadaire de Laryngologie et d'Otologie, April 8, 1899.

[2] Philadelphia Medical Journal, May 6, 1899.

Closing Perforations of the Drum Membrane. A year ago I published an account of Miot's[2] method of closing perforations of the drum membrane. I may say that various methods have been tried to bring about this result, but generally failure has followed. Some years ago Okuneff experimented upon forty-two cases by touching the edges of the perforation with trichloracetic acid. His results were most gratifying. In twenty-two cases there was complete healing-over of the membrane. This method has been tried with equal success by Gomperz and others, and recently Peltesohn[3] has subjected the method to trial, and in a number of cases has obtained most satisfactory results. Peltesohn reports seven cases, in five of which he obtained perfect healing-over of the membrane. In the other two cases the perforations were getting smaller every day at the time of the report. In five of the cases there was suppuration going on all the time. The pain following an application is quite severe, so that it is always well to use cocaine, and one must be careful not to follow one application too closely by another. Let the ear recover entirely from the effect of one before another application of the acid is made.

There are certain contraindications to the employment of this method of treatment to which Peltesohn has called our attention. First of all, in cases of pronounced tinnitus the probabilities are that closure of the perforation will intensify the tinnitus. I must say in this connection, however, that I have seen more than one case where the closure of a perforation by an artificial drum has caused subjective noises to disappear. Peltesohn speaks of the dangers of retention in those cases where suppuration is going on by too early a closure of the perforation, but I hardly think a perforation will close so long as suppuration exists; certainly not in cases where the disease has invaded the antrum. A fact which Peltesohn mentions, and one worthy of note, is that in none of the cases reported were there any bad effects produced upon the hearing.

Ophthalmoscopic Examination in Suppurative Inflammation of the Middle Ear. It will be remembered that Zaufal nearly twenty years ago called attention to the changes which are sometimes to be seen in the eye-grounds of those who are suffering with chronic suppurative inflammation of the middle ear. Frequently both eyes are affected, but generally it is the eye on the side of the worse ear. Cases have been seen, however, where the eye was involved on the side opposite to the worse ear. After operation (mastoid) it is the eye on the operated side which recovers first, while the fellow-eye gets well slowly. The observations of Gradenigo have done much to strengthen the truth of these statements of Zaufal. Gradenigo goes so far as to say that the ocular lesions are often the only evidences at hand which point to an extension of the ear disease to the brain. Jansen, Kipp, Roosa, Brieger and others do not express themselves so strongly as to the importance of these symptoms as indicating cerebral involvement. Most of the observers, then, are in accord as to the connection between certain ear diseases and changes in the eye-grounds, but they do not agree as to the special significance of these changes. Jansen, for example, is of the opinion that changes in the eye-grounds are rare outside of sinus thrombosis cases, while Gradenigo thinks that they are very frequent in cases of cerebral abscess. Zaufal, Gradenigo and others admit that the changes can be seen in only one eye, while Jansen views such a case with great skepticism. Barnick holds that a fatal termination is imminent if the neuritis persists after the operation, while Jansen expresses the opinion that even if the neuritis gets worse after the operation it is by no means an indication that the case is hopeless.

---

[1] Berliner klinische Wochenschrift, No. 37, 1899.

[2] PROGRESSIVE MEDICINE, March, 1899, vol. I.

[3] Berliner klinische Wochenschrift, 1899, No. 16.

There was quite a full and interesting discussion on this subject at the June meeting of the Belgian Otological and Laryngological Society,[1] on which occasion the younger Delstanche presented an analysis of 122 cases. Sixty-seven times the examination of the eye-grounds showed optic neuritis, and in fifty-five cases the examination was negative. In 54 per cent. of the cases which were examined there was optic neuritis, and these figures, compared with those of Gradenigo (52.3 per cent.) and Jansen (53 per cent.), show that in this class of cases more than half are characterized by the presence of intra-ocular changes.

Dry Air in the Treatment of Middle-ear Suppuration. Dry air has been strongly advocated by Andrews, of New York, as a therapeutic measure in treating suppuration of the middle ear. The treatment is based upon the principle that a dry soil is unfavorable for the growth of bacteria. It is not to be expected that the middle ear can be as thoroughly dried as a bone cavity, but Andrews has devised an apparatus for the purpose, which he claims to have used with great success for six years in treating suppuration of the middle ear.

---

[1] Annales de l'Oreille du Larynx, etc., July, 1899.

The Contagiousness of Inflammation of the Middle Ear. Lermoyez[1] has endeavored to prove that acute inflammation of the middle ear is a contagious affection. He cites a number of cases to prove his point, but it seems to me that his arguments are far from convincing. In every instance the person to develop ear trouble was already under the influence of a general infection, usually of grippe, and the development of ear symptoms in the second patient can readily be attributed to an infection of the same character.

Tumors of the Middle Ear. Tumors of the middle ear are undoubtedly very rare. Bezold, of Munich,[2] from 1893-1896 saw 5327 ear patients, and encountered sarcoma of the middle ear but once. Gruber,[3] during 1890 and 1891, saw in his clinic 10,157 new ear cases without once meeting with a case of sarcoma of the middle ear. So far as I know the case which has recently been reported by L. D. Brose, of Evansville, Ind., is the only one which has been observed in this country.[4] The growth filled up the external auditory canal and was removed several times with a snare only to return very promptly. An enlargement appeared just behind the auricle, and the attending physician, becoming alarmed, referred the child (who was only four years old) to a specialist. The child at this time was anæmic and evidently in a very much weakened condition. The growth behind the auricle had been increasing in size, and at this time was as large as a hen's egg. It was found that the growth involved the mastoid, which, as far as possible, was removed. The mass in the external auditory canal was easily removed with a snare. In less than three weeks the mass had returned in the canal and also behind the auricle. The child soon after died in convulsive movements. A microscopical examination showed the growth to be a small round-celled and spindle-celled sarcoma.

I might mention in connection with this subject that Sprague, of Providence, has reported this year a case of adenocarcinoma of the cartilaginous meatus in a woman of sixty-two.[5]

The Bacteriology of Suppuration of the Middle Ear. In the last few years there has been little or no work done in connection with the bacteriology of the ear. It will be remembered that Löwenberg first made bacteriological examinations (in 1881) of the exudate from suppurating ears, and that he found in a large majority of cases micrococci. In the few years following contributions were made by Netter, Zaufal and others, who obtained results which were more or less similar, all finding, as a rule, the pneumococcus of Fränkel, the streptococcus pyogenes, pyogenic staphylococcus, Friedländer pneumococcus, and the Weichselbaum-Jaeger meningococcus intracellularis.

---

[1] Annales des Maladies de l'Oreille, du Larynx, etc., October, 1899.

[2] Archives of Otology, vol. xxviii., No. 4.

[3] Monatsschrift für Ohrenheilkunde, May, 1899.

[4] Archives of Otology, vol. xxviii., Nos. 2 and 3.

[5] Ibid., No. 4.

Leutert, of Königsberg, in Prussia, has recently made an exhaustive contribution[1] to this aspect of otology. He has gone over the subject in the most thorough manner, and gives the results of bacteriological examinations in a great number of cases of acute and chronic suppurative inflammation of the middle ear, and also of the various complications of this disease. He found in those cases where the suppuration was caused by the pneumococcus that the results of the disease were less apt to be serious, as evidenced by the early cessation of the discharge in a number of cases, by the absence of high temperature, and by less destruction of parts. This is accounted for by the fact that the organism which is found in the discharge is in an attenuated condition.

It should be mentioned here that both Netter and Zaufal have arrived at similar conclusions. Leutert's results indicate that in sinus thrombosis we almost always have a streptococcus infection, and the same may be said of the otitis which is found as a result of scarlatina, a fact which suggests that the special organism of scarlatina has probably little or nothing to do with the process in the ear. And I might add that the suppurations which follow measles and diphtheria are frequently found to be caused by a streptococcus. It is interesting to observe that in four cases of perichondritis of the auricle Leutert found the bacillus pyocaneus in pure culture.

Meniere's Disease. TREATMENT. It cannot be said that any decided advance has been made in the therapeutics of this disease during the past year. Not a little has been written upon the subject, such, for instance, as Coutrade's exhaustive thesis,[2] but like most other contributions of the year on this subject, it is the same old story. Ménière in those cases where he was able to establish the existence of either rheumatism or of gout gave salicylates and the other remedies which are usually employed in these two affections, and gave mercury when there was a history of syphilis. Charcot's treatment consisted in the administration of quinine, at first in small doses, finally reaching fifteen grains in a day. The first effect of this treatment was to increase the subjective noises, but these gradually diminished in intensity and finally disappeared. The remedy which seems to give the best results is nitrate of pilocarpine administered hypodermatically in the dose of $\frac{1}{4}$ grain daily, and this treatment should be commenced promptly. Not very long since Burnett, of Philadelphia, reported a very interesting case of this disease which he treated by removing the incus.[1] The result of the operation was to relieve the vertigo, but the subjective noises and vertigo persisted. In this case there was great mobility of the stirrup; this was ascertained by means of the sound during the operation and it rendered the patient particularly liable to attacks of vertigo from a sudden retraction of the ossicles by the tensor tympani, impaction of the stapes upon the over-distended labyrinth, and consequent undue compression of the ampullæ.

---

[1] Archiv fur Ohrenheilkunde, Band xlvi., Heft 3 and 4, and Band xlvii., Heft 1 and 2.

[2] Annales des Maladies de l'Oreille du Larynx, etc., March, 1899.

The Treatment of Nasal and Pharyngeal Affections. I have frequently seen severe inflammation of the middle ear follow an operation for removing spurs and hypertrophied mucous membrane from the nares. I would, therefore, emphasize the necessity of working with clean hands and instruments. Wertheim,[2] of Breslau, has called attention to this point. The result of his operations shows the absolute necessity of asepsis in nasal operations. Antiseptic operations are useless, since the microbes cannot be reached in the nooks and corners of the nose. Bactericidal drugs are not borne in proper concentration and quantity, and are transformed by the albuminous secretions into inefficacious combinations. We must operate, then, with clean hands and instruments in order not to transfer infective agents from without, since the agents existing in the nose remain innocuous under normal conditions, owing to the protective arrangements of the nose. Cauterization of the middle turbinated bones should be avoided on account of endocranial complications which have been most frequently observed after measures of this kind. Plugging should be done with antiseptic gauze sterilized by steam, and the plug ought not to be left in the nose longer than twenty-four hours. In all cases the direct treatment of the bleeding spot should be attempted. After the hemorrhage has ceased the parts should be covered by an antiseptic, such as iodol, iodoform, or indifferent sterilizable powders. Wertheim alludes especially to the dangers of infection which arise from therapeutic measures to arrest epistaxis. In several autopsies it was found that in every case of severe epistaxis blood usually enters the middle ear through the Eustachian tube or through the nasal accessory cavities. Plugging favors the suppuration of these extravasations.

THE MASTOID.

Percussion of the Mastoid Process. The merits of this method of determining the condition of the mastoid do not seem to have found much recognition at the hands of the profession. The results published by Michael, Lücke, Wild, Körner and others are not satisfying by any means. Five years ago Eulenstein, of Frankfort-on-the-Main, reported the results of the examination of ten cases of acute disease of the mastoid in which he arrived at these conclusions: 1. By means of percussion (compared with that of the other side) a positive diagnosis of disease of the mastoid may be made, provided dulness is elicited. 2. Dulness on percussion indicates the presence of a diseased area near the surface of the bone, the degree of dulness depending upon the extent of the area involved. 3. Absence of dulness is not proof that the bone is not involved. 4. When other symptoms of mastoid disease are present and there is no dulness on percussion it is an indication that the disease is either very deep-seated or that the area involved is very small. It should be said that more recently these results have been verified by Haug. In looking over the histories of the last ten cases reported by Eulenstein,[1] one cannot help thinking that this symptom is an important aid to diagnosis, and that it should be looked for in all cases of suspected mastoiditis.

---

[1] American Journal of the Medical Sciences, April, 1899.

[2] Archives of Otology, vol. xxviii., No. 4.

Sinus Thrombosis. Last year otological literature was simply teeming with accounts of operations for sinus thrombosis, and while there is no dearth of communications on this subject for 1899, I have been unable to find anything in this connection which might be regarded as a valuable addition to our knowledge, with one exception, which possesses at least the merit of novelty. I refer to a symptom described by Voss, of Riga.[2] A stethoscope is placed upon the external jugular, making light pressure upon the latter vein. A continuous murmur will be heard. This murmur is never heard in other affections, and is therefore characteristic of sinus thrombosis. The best place to make the test is close to the base of the skull. The stroke of the carotid is used as a guide, and we must not press so hard that this stroke is obliterated. It is well to examine the patient in both the lying and standing positions. Voss refers to several cases in which this symptom was observed. Absence of the murmur above and its presence in the middle of the neck may be explained by the condition of the facial vein.

TREATMENT. *Exenteration of the Tympanic Cavities.* While there is nothing especially noteworthy in the literature of sinus thrombosis for the past year, it is to be noted that the opinions of otologists are gradually crystallizing into a belief in the value of simple exenteration of the tympanic cavities. I have long been impressed with the reasonableness of this operation, and have more than once called attention to the fact that ossiculectomy in the hands of the majority of us has been weighed in the balance and found wanting. I have seen several cases in which ossiculectomy has been performed for chronic suppuration of the middle ear, and in all of them the discharge has continued as bad as ever. I have only performed the operation twice, but failed in both cases to put a stop to the otorrhœa.

---

[1] Archives of Otology, vol. xxviii., Nos. 2 and 3.

[2] Ibid., No. 4.

Exenteration is an operation which involves a great many details, and which is beset with that bugbear, danger of injury to the facial nerve. J. Orne Green in twenty-five cases reports injury to the facial nerve in six; but in all but one the paralysis was only temporary, and in that one he had found at the operation a carious opening into the Fallopian canal. The operation, according to Randall, is best done after Stacke's method—that is, without opening the mastoid cortex. The soft parts are laid forward, and, after chiselling into the back part of the canal, the auditus is entered and the opening is enlarged with safety by keeping a bridge of the bony annulus intact over the facial canal and stapes. This bridge is finally broken away by an outward sweep of the spoon. The outer mastoid table is only touched in case it is diseased. In replacing the soft parts the back wall of the canal is split into a cutaneous and a periosteal layer, with excision of all cartilaginous tissue, giving better flaps of double extent for covering the bone surfaces. This method of securing the two flaps was suggested by Randall. Green advises all patients to have the ear inspected at least once every six or eight months, in order to remove any collections of desquamated epithelium.

At the meeting of the International Otological Congress in London, August, 1899, an interesting discussion was participated in by Politzer, Luc, Macewen, Knapp and others. The main point[1] in the discussion, and a point which was kept well to the front, was whether it was justifiable, without well-defined symptoms, to operate as frequently as some operators advocate. I gathered from the discussion that the general opinion is settling down to the belief that too much time is wasted in non-operative measures, and that the future will show an increased number of mastoid operations. So far as intratympanic surgery is concerned, I am convinced that what was said on this occasion is true. I do not think, however, that the fact that a discharge has existed for a long time is sufficient reason for the mastoid operation. Milligan, on the other hand, advises the operation in all cases where the conservative treatment has been shown, after twelve months' trial, to be futile. My own experience has taught me that some cases will require even a longer time for cure—or, I might say, that the safety of the patient will not be jeopardized by pursuing a conservative course for over a year, and that it is no surprising thing to see such a patient get well. It goes without saying, that to cure a chronic suppuration by conservative measures is a greater triumph than to do so by operation. To operate for a simple discharge is unwise, yet there are not a few who appear to adopt this course. The operation is always a serious one when we consider the important structures in the vicinity which may be injured, and, as Politzer says, the danger of permanent impairment of hearing in those who before the operation could hear reasonably well is ever present; finally, it should not be forgotten that in a number of these cases the healing process is exceedingly protracted.

---

[1] British Medical Journal, August 19, 1899.

HYSTERIA OF THE EAR.

At the last meeting of the French Society of Otology and Laryngology there arose an interesting discussion on this subject, one which finds little or no mention in the text-books on the ear. The principal manifestations of hysteria of the ear are: 1. Morbid acuteness of hearing (hyperacousia). 2. Earache. 3. Spontaneous hemorrhage; hysterical traumatism. 4. Deaf-mutism.

While the hearing is morbidly acute there is no tinnitus. These cases must be sharply differentiated from those in which the labyrinth is involved. In the former case there is an absence of either tinnitus or of vertigo, and frequently there are variations in the acuteness of hearing, while in labyrinthian disease vertigo and subjective noises are invariable symptoms. The hemorrhages are comparable to those from the stomach, and are often periodic. Hystero-traumatism and deaf-mutism appear suddenly and give a favorable prognosis.

In the discussion the majority were of the opinion that in such cases other hysterical manifestations are to be found; in other words, that there is probably no such thing as a purely aural hysteria. Lermoyez has reported a case where the patient had lost cranial conduction and yet could hear spoken words perfectly. A case is on record where a young woman became suddenly deaf immediately after hearing a clap of thunder.

Tinnitus, it will be remembered, is absent, as a rule, but cases have been reported by Jankelevitsch where tinnitus was very pronounced, the subjects being hysterical women. According to Hammerschlag, an invariable symptom is a contradiction between the osseous conduction on the one hand and the hearing-distance for the voice on the other. This is illustrated by Lermoyez's case. Anaesthesia of the auricle is a common symptom, and was seen in the case reported by Hammerschlag. The latter has called our attention to the fact that in troubles of this character there is an absence of symptoms which might be attributed to the vestibular nerve.

DEAF-MUTISM.

Among cases of deaf-mutism it has been found that in nearly 60 per cent. the condition is congenital.[1] Here arises the question of consanguinity, which it is clear from statistics plays a very unimportant rôle. In an analysis of 500 cases at the institution for deaf-mutes at Lille, France, it was found that in only seven cases was it possible to trace the condition to the marriage of near relations. These figures probably express the true state of the case, as they agree with other statistics bearing upon this aspect of the question. Direct heredity, then, is not often a factor—indeed rarely so—a fact which has been established by the researches of Hartmann. One would suppose that suppurative inflammation of the middle ear would be a frequent cause, but such is not the case, as is shown from a study of the reports of the various institutions for the deaf and dumb.

The principal affections which lead to deaf-mutism are typhoid fever, adenoid vegetations, and cerebral troubles. It is a remarkable fact that more than half the children which are brought to the institutions have some deformity in the pharyngeal region ; usually the palate is more or less lance-shaped, and there is but little space between the palate and the pharyngeal walls. The little subjects show deviated septa and such irregularities in the development of the bones that the air is almost prevented from passing through the nose.

Treatment. It is exceedingly interesting to read an account of the methods of treatment pursued in the best deaf and dumb institutions. Take, for instance, the one at Lille, to which reference has been made. From the first the children are put to work at suitable gymnastic exercises, which have the effect not only of making them supple but of aiding in the development of the chest and so facilitating respiration. After a few months the chest broadens and becomes less round. The respiratory play becomes fuller, less jerky and less wheezing.

It seems that at most of these institutions there is a common complaint—namely, that the children are taken away too soon. To get rid of this great disadvantage to the pupils a law has been made in some countries, notably in France, which prevents the parents from removing the children till they have been in the institution at least eight years, and in some places they are required to stay as long as ten years.

The oral method is that usually followed in instructing the children. At first the child's attention is engaged, and he is induced to imitate movements of the lips, such, for instance, as whistling and speaking, and also to imitate the movements of respiration. Great stress is laid on this stage of their education—indeed, I think it would be well were this scheme or primary step in the education taken up and conducted at home as soon as possible—in fact, before they are placed in an institution. In Lille the classes contain about ten scholars. The oral method practically consists in teaching the child how to form a word and incidentally how to shape the lips. This word is the foundation upon which is built all further communication between teacher and pupil. Instruction is given in writing, speech, arithmetic, hygiene, and some history and geography. Great attention is devoted to the study of the voice, and here it is easy to see that gymnastic exercises have proved of great assistance. A study of the voices of ten children who had been under observation a year and a half showed that in every case a distinct gain had been made. Most of the children had gained a half-note, and some even as many as three or four notes.

---

[1] Revue Hebdomadaire de Laryngologie, d'Otologie, etc., March 25, 1899.

We are all familiar with the jerky, harsh voice of the deaf-mute. To ameliorate this condition a great deal is expected from spirometry, by means of which the patient is taught to prolong his voice, to speak less in monosyllables, to read more fluently. Nasal pulsometry is also practised, and this insures the passage of air through the nose, gives purity to the voice, and at the same time takes away its nasal quality. It is interesting to note that in the reports for 1895 of the various institutions for this class of sufferers, it was shown that among 32,400 deaf-mutes there were 4300 who had traces of hearing. We cannot lay too great stress upon the importance of developing these rudiments of hearing, for, as far as I can learn, this percentage of pupils who have traces of hearing is the rule. And now comes the method of acoustic exercises, of which so much has been done in Austria, notably by Professor Urbantschitsch. The children are at first practised in hearing simple noises, musical instruments, etc. They are later made to listen to words, and then to vowels, and after they have overcome these difficulties they are taken on to numbers, to syllables, little words, and phrases. It is astonishing to see the results which have been obtained in some of the best schools for the deaf and dumb, all of which goes to show that these poor unfortunates can be made useful members of a community by intelligent treatment. It was found that in eighteen marriages which had occurred in a certain number of graduates from the institution at Lille, eight had been fruitful, and in not a single case was the child deaf and dumb. The more I study the conduct of these institutions the more I am convinced of the necessity of frequent consultation between the head of the establishment and a competent otologist.

And this brings me to a notice of the work of Professor Urbantschitsch. Although there are many who differ with the Vienna professor in regard to the value of his method, there are none, perhaps, who fail to recognize that he has done a great deal of good in calling our attention to the question of how to educate these unfortunates. At all events, the evidence which is slowly accumulating shows that this work is bearing fruit. The method consists in what are called hearing exercises—that is to say, in a study of the various kinds of sounds on the one hand, and on the other hand in methodical instruction in speaking.

(*a*) GENERAL HEARING EXERCISES. The attention of the patient is directed to the different kinds of sounds which he is required to observe closely, such, for instance, as the noise of street life, into which enter the rumble of carts, the ringing of bells, and men's voices. In this connection Urbantschitsch mentions the case of a very deaf girl who heard indistinctly the street noises, and who was unable to notice any variety in the sounds. She was told to observe carefully every noise. The next day she reported with delight that she heard for the first time the signal bell of a wagon, and that she heard better what was said. This is to be explained by the fact that her attention having been aroused to the different sounds the effect was an improvement in hearing.

It is evident that Urbantschitsch lays great stress upon the attention as an important factor in the appreciation of sound. In illustration of this he refers to the case of a boy who was exceedingly deaf, and who, while playing, gave no evidence of hearing the notes of a bugle which was blown just behind him. A few hours afterward, seeing the bugle lying on a box, he requested some one to blow it. He not only heard it, but said that he had heard the same sound while playing, but had paid no attention to it as he did not want to be interrupted. Urbantschitsch advises the deaf to go to the theatre and seize every opportunity which offers a temptation to hear. Another very interesting case described by him is that of a woman who had suffered with chronic aural catarrh for twenty-five years, and who was only able to hear speech close up to her ears, but who, nevertheless, lead an active social life. During the summer months she was in the habit of spending the time in the mountains, where it was lonely and where she saw very few people. On her return to the city it was found that her deafness had increased so as to make conversation nothing but a burden, yet after a few weeks among her friends her hearing had improved to such an extent that she could hear as well as she could before she left the city.

In cases where the deafness is more marked in one ear than in the other, it is the habit to turn the better ear toward the sound—in other words, to use the better ear for hearing. The result will be increasing deafness in the worse ear. Urbantschitsch advises in such cases that the worse ear be regularly exercised and be used as much as possible for hearing; in this way the torpidity of the organ will be overcome. He has more than once noticed that after such advice has been faithfully followed the hearing in the worse ear not only improved, but became better than the hearing of its fellow. This seems to indicate that in a certain number of cases, at least, organic changes are not responsible for deafness in an ear, but that the deafness is to be attributed to non-use or to want of attention to the sounds which reach this ear.

(*b*) METHODICAL HEARING EXERCISES. The manner of procedure is as follows: If the case is one of one-sided deafness the well ear should be closed. The words are then spoken into the deaf ear from various positions, care being taken that the patient does not see the movements of the lips. The distance of the speaker from the ear should be regulated by the hearing-power of the patient, and in connection with this point it is better to stand at such a distance that the patient will have to bring every bit of his attention into play in order to hear. The voice should be no louder than the ordinary conversation tone. The exercises should consist of short or of long sentences, of single words, of syllables or of letters, especially consonants.

Urbantschitsch goes into a long and detailed account of his method which is exceedingly interesting, and some of which is no doubt very valuable. While he acknowledges that many cases will not be helped by his method, and that others have not the patience to try it, still, in the majority of cases, faithful practice has always ended in marked improvement of the hearing.

In the discussion which followed the publication of this communication Urbantschitsch found himself almost alone. Professor Politzer went over the entire subject in a masterly way, basing his opposition almost entirely upon the anatomical conditions which exist in the deaf ear, these conditions being such as to preclude the possibility of any such subjective improvement as was reported by Urbantschitsch. In fact, Politzer seemed disposed to hold the communication up to scorn. It would certainly seem that Urbantschitsch has fallen into a grievous error of observation when he reports the case of a child, who had been deaf for fifteen years as a result of cerebro-spinal meningitis, to have heard words and sentences after a few trials with his method.

It is evident that the method should be subjected to an extended trial before passing judgment upon it, and it will be many years before we can speak positively as to its value. As I have said, we owe much to Urbantschitsch for having called the attention of otologists to this question, and it is to be hoped that good will arise from the thorough ventilation of the subject.

INDEX.

ABSCESS, alveolar, 31
  of the brain, mastoid suppuration and, 124
    treatment of, 124
  cerebral, purulent encephalitis and, in a new-born infant, 230
  pulmonary. *See* Pulmonary abscess.
  retropharyngeal, 33
    treatment of, 33
Acarus folliculorum, 343
Accessory sinus empyema, fatal cases of, 360
  sinuses, nasal, 357
    frequency of infection of, 357
Acid-proof bacilli, new, and further studies in this group, 303
Actinomycotic nodule, histogenesis of, 304
Action of digestive ferments on toxins and antitoxins, 283
  mode of, of antitoxins, 287
  of streptococci and their toxins upon organs of the body, 311
  of tuberculin, 304
Acute articular rheumatism, 139
      bacteriology of, 142
      etiology of, 139
      symptoms of, 141
      treatment of, 150
  infectious diseases, 133
    fevers, eye complications of, 222
  inflammation of the middle ear, treatment of, 400
  peritonitis in children, 245
  rheumatic polyarthritis in infancy, 272
      diagnosis of, 273
Addison's disease in childhood. 274
Adenitis, tuberculous, 271
    treatment of, 272
Adenosarcoma, embryonal, of the kidney, 332
Adhesions after brain operations, 100
      prevention of, 101
Adrenals, hypoplasia of the, and hydrocephalus, 321
Aërogenes capsulatus, bacillus, 309
Affections, aural, effect of sea climate and sea-bathing on, 398
  of the alimentary tract in children, 236
  of the heart, relation of, to night-terrors of children, 268
  of the nervous system in children, 264
  of the nose and throat, use of certain anæsthetics in, 368
Affections of the respiratory organs in children, 251
      coin test as an aid in diagnosis of, 251
  of the upper respiratory passages in children, 249
Agglutinating power of the blood, transmission of, from mother to fœtus, 161
Agglutination of serum, 286
    mechanism of, 287
Air, dry, in the treatment of middle-ear suppuration, 403
Alimentary tract, affections of, in children, 236
Alveolar abscess, 31
Anaërobic bacillus, new, of gangrene foudroyante, 311
Anæsthesia in empyema, 51
  in middle ear operations, 394
  Schleich's general, 368
    local, 370
Anæsthetic, local, for operations upon external auditory canal, 388
    menthol, carbolic acid, and cocaine as a, 371
Anæsthetics in operating for goitre, 21
  use of certain, in affections of the nose and throat, 368
Aneurism of the aorta, 92
    in an infant, 259
    treatment of, 92
  subclavian, 96
    ligation of the first part of the subclavian for, 96
Anginoid pain following influenza, 205
Animals, occurrence of carcinoma in the lower, 331
Ankylostomum duodenale, 342
Anomalous rashes in typhoid fever, 165
Antidiphtheritic serum in the treatment of ozæna, 348
Antiseptics, use of, in typhoid fever, 182
Antistreptococcic serum in the treatment of cerebro-spinal fever, 215
    use of, in infective sinus thrombosis, 126
Antitoxin, diphtheria, 151
  typhoid, 186
Antitoxins, mode of action of, 287
  regeneration of, 289
  toxins and, action of digestive ferments on, 283
Aorta, aneurism of the, 92
    in an infant, 259

Aorta, aneurism of the, treatment of, 92
Apparatus, Hutton's, for drainage in empyema, 51
Appendicitis in children, 245
Area, præcordial, in children, 255
Argonin, use of, in otitis externa diffusa, 388
Arsenical origin of carcinoma, 330
Arthritis in the course of pneumonia, 201
  in infants, following purulent ophthalmia, 226
Arthropoda, 343
Articular rheumatism, acute, 139
    bacteriology of, 142
    etiology of, 139
    symptoms of, 141
    treatment of, 150
Artificial feeding of infants, 230
Aspiration, uses of, in empyema, 49
Asthma and nasal disease, 353
Atmospheric changes, effect of, on the hearing in chronic aural catarrh, 397
Atrophy, infantile, 241
    treatment of, 241
Attacks, repeated, in typhoid fever, 187
Atypical ray fungi, 297
Auditory canal, external, desquamation of, 388
      treatment of, 388
    exostoses of the, 391
      treatment of, 391
    foreign bodies in the, 390, 391
        treatment of, 390
  meatus, external, new local anæsthetic for operations upon, 388
    treatment of boils in the, 385
Aural affections, effect of sea climate and sea-bathing on, 398
  catarrh, chronic, effect of atmospheric changes on hearing of, 397
Auricle of the ear, noma of, 389
    plastic operations on, 389
    tumors of, 392
Autodigestion, pancreatic, 322

BACILLI, branching diphtheria, 301
  the capsulated, 307
  new acid-proof, and further studies in this group, 303
  tubercle, a new stain for, 306
    modified, 298
  typhoid, action of, upon the nervous system, 171
    in the gall-bladder, 169
    in the roseola, 165
    in the urine, 167
Bacillus aërogenes capsulatus, 309
  colon, protective rôle of the liver against, 281
  mucosus capsulatus, 308
  new anaërobic, of gangrene foudroyante, 311
  tetanus, 311
Bacteria in milk, separation 231
  in normal peribronchial lymph-glands, 277
Bacteria, relation of ray fungi to certain, 296
Bacteriology of acute articular rheumatism, 142
  of suppuration of the middle ear, 404
Belladonna in the treatment of bronchopneumonia in children, 252
Birth-marks, treatment of, 46
Bladders, urinary and gall, regeneration of the mucous membrane of the, 319
Blastomycetes and carcinoma, 293
  pathogenic, 292
Blastomycetic dermatitis, 295
Blood, agglutinating power of, transmission of, from mother to fœtus, 161
  agglutination of serum of, 286
  in chronic diseases, 312
  examination of the, in the infections, 138
  in malaria, 193
    examination of, 193
  in meningitis, 312
  in nurslings, influence of gastro-intestinal diseases on, 240
  phagocytosis of, 284
  in pneumonia, 312
  in sepsis, 312
Bodies, foreign. *See* Foreign bodies.
Boils of external ear, treatment of, 385
Bolognini's sign of measles, 219
Bone, implantation of, after trephining the skull, 97
Bowel, perforation of, in typhoid fever, 176
      diagnosis of, 176
Brain, adhesions after operations upon, 100
      prevention of, 101
  mastoid suppuration and abscess of the, 124
      treatment of, 124
  retained foreign bodies in the, 106
      treatment of, 107
  surgery of the skull and, 97
Branching diphtheria bacilli, 301
Breast. *See also* Mammary gland.
  carcinoma of the 71
    diagnosis of, 71
    treatment of, 71
      in inoperable cases of, 79
  cysts of the, 69
    treatment of, 70
Bronchi, foreign bodies in the, 54
      treatment of, 55
Bronchocele, 20
  treatment of, 20
Bronchopneumonia in children, treatment of, 252
Bronzed diabetes, hæmochromatosis and, 323

CABINET, pneumatic, in the treatment of catarrhal deafness, 396
Canal, external auditory. *See* External auditory canal.
Cancer of the breast. *See* Carcinoma of the breast.
  influence of location on, 326
  statistics of, and its supposed increase, 326

Capsulated bacilli, the, 307
Capsule, suprarenal, use of extract of, in the nose and throat, 375
Carbohydrates, influence of, in infant foods, 231
Carbolic acid and cocaine, menthol, as a local anæsthetic, 371
Carcinoma, arsenical origin of, 330
  blastomycetes and, 292
  of the breast, 71
    diagnosis of, 71
    inoperable, treatment of, 82
    recurrent, oöphorectomy for, 82
    treatment of, 71
  of the lip, 37
    treatment of, 38
  occurrence of, in the lower animals, 331
  of the thyroid gland, 23
    treatment of, 24
  of the tongue, 36
    treatment of, 36
Catarrh, chronic aural, effect of atmospheric changes on hearing of, 397
Catarrhal deafness, the pneumatic cabinet in the treatment of, 396
Catheterization of the ear, 399
Causes of incontinence of urine in children, 260
Caustics, use of, in the treatment of epithelioma, 32
Cavities, serous, free tumor metastases in, 331
Cavity, cranial, methods of opening, 97
  tympanic, exenteration of, 407
Cell, the plasma, 316
Central pneumonia, diagnosis of, 200
Cereals in the preparation of infant foods, 231
Cerebral abscess, purulent encephalitis and, in a new-born infant, 230
Cerebro-spinal fever, 207
    etiology and diagnosis of, 207
    treatment of, 213
Cestoda, 341
Change of epithelium into connective tissue, 318
Changes, progressive, inflammation and, 316
  retrogressive, 321
Cheiloplasty, a new modification of, 40
Chest, hemorrhage following exploratory puncture of, 253
  operations about the, use of Fell-O'Dwyer apparatus in, 48
  surgery of the head, neck, and, 17
  surgical operations about the, 47
  tumors of the walls of the, 47
      treatment of, 47
Childhood, Addison's disease in, 274
  typhoid fever in infancy and, 274
        prognosis of, 275
        symptoms of, 374
        treatment of, 275
Children. *See also* New-born, the
  affections of the alimentary canal in, 236
    of the nervous system in, 264
Children, affections of the respiratory organs in, 251
      coin test as an aid in diagnosis of, 251
    of the upper respiratory passages in, 249
  appendicitis in, 245
  cholelithiasis in infants and, 247
  condition of fatty liver in, 248
  constitutional diseases of, 269
  convulsions in, etiology of, 267
  cystitis in, 262
    treatment of, 262
    tubercular, 262
  diseases of, 225
    the circulatory system in, 254
    the urino-genital tract in, 259
  endocarditis in, tonsillar origin of, 256
  gastro-enteritis in, 240
    influence of, on the blood, 240
  hemorrhage following exploratory puncture of the chest in, 253
  incontinence of urine in, 259
      causes of, 260
      treatment of, 261
  indurative mediastinitis in, 257
      diagnosis of, 258
      treatment of, 259
  Kernig's sign in meningitis in, 265
  laryngeal spasm in, 249
  nervous incontinence of feces in, 242
  night-terrors in, 268
  præcordial area in, 255
  pericarditis in, 256
    diagnosis of, 257
    prognosis of, 257
    treatment of, 257
  peritonitis in, acute, 245
    gonococcic, 246
    purulent, caused by lumbrici, 247
  plantar reflex as an aid in diagnosis in, 264
  pneumothorax in young, 254
  renal complications of gastro-enteritis in, 240
  retention of urine in, due to spasm of the sphincter vesicæ, 261
  rumination in, 239
    treatment of, 239
  status lymphaticus in, 250
  stricture of the œsophagus in, 236
      treatment of, 236
  tracheocele in, 249
  treatment of bronchopneumonia in, 252
  tuberculosis in, 269
    symptoms and diagnosis of, 270
  tuberculous adenitis in, 271
      treatment of, 272
  value of Credé's solution in eyes of the new born, 226
Cholelithiasis in infancy and childhood, 247
Chorea, 266
  handwriting in, 266
  sensory phenomena in, 266
  treatment of, 267
Chronic aural catarrh, effect of atmospheric changes on hearing of, 397

Chronic diseases, blood in, 312
Circulation, disturbances of, 313
  effects of influenza upon, 203
Circulatory system, diseases of, in children, 254
Classification and nomenclature of the ray fungi, 296
Cleft palate, 44
    operation for, 44
Closing perforations of the drum membrane, 402
Cocaine, menthol, carbolic acid and, as a local anæsthetic, 371
Coexistence of malaria and typhoid, 194
Coin test as an aid in diagnosis of respiratory affections in children, 251
Collapse, pulmonary, Fell-O'Dwyer apparatus for the prevention of, 48
Colon bacillus, protective rôle of the liver against, 281
  congenital idiopathic dilatation of the, 242
      treatment of, 243
Complications, eye, of acute infectious fevers, 222
  heart, of diphtheria, 155
  of the infectious fevers, 174
  of influenza, 203
  of measles, 221
  of pneumonia, 201
  renal, of gastro-enteritis in children, 240
Congenital disease of the heart, diagnosis of, 254
  idiopathic dilatation of the colon, 242
      treatment of, 243
  laryngeal stridor, 249
      etiology and pathology of, 378
      or infantile respiratory spasm, 377
  occlusion of the stomach, 230
  stenosis of the pylorus, with hypertrophy, 238
      treatment of, 239
Congenitally weak infants, lowered temperature in, 225
Connective tissue, change of epithelium into, 318
    fibrinoid degeneration of, 317
Constitutional diseases of children, 269
Contagiousness of inflammation of the middle ear, 404
Convulsions in children, etiology of, 267
Cou, phlegmon ligneux du, 35
    symptoms of, 35
Cranial cavity, methods of opening, 97
Craniotomy for microcephalus, 112
Credé unguentum, 214
    in the treatment of cerebro-spinal fever, 214
Credé's solution, value of, in new-born children's eyes, 226
Cupric electrolysis in the treatment of ozæna, 347
Cystic degeneration of the kidneys in the new-born, 230
Cystitis in children, 262
Cystitis in children, treatment of, 262
    tubercular, 262
Cysts of the breast, 69
    treatment of, 70

DEAF-MUTISM, 410
  treatment of, 410
Deafness, catarrhal, the pneumatic cabinet in the treatment of, 396
Deflection of the nasal septum, treatment of, 350
Deformity following operation for frontal sinus suppuration, relief of, 367
Degeneration, cystic, of the kidneys in the new-born, 230
  fatty, 321
  fibrinoid, of connective tissue, 317
  micans of glia tissue, 323
Dermatitis, blastomycetic, 295
Desquamation of the external auditory canal, 388
    treatment of, 388
Diabetes, bronzed, hæmochromatosis and, 323
Diagnosis of acute rheumatic polyarthritis in infancy, 273
  of affections of the respiratory tract in children, coin test as an aid in, 251
  of carcinoma of the breast, 71
  of central pneumonia, 200
  of congenital disease of the heart, 254
  and etiology of cerebro-spinal fever, 207
  of indurative mediastinitis in children, 258
  of perforation of the bowel in typhoid fever, 176
  of pericarditis in children, 257
  plantar reflex as an aid in, 264
  of pneumothorax, 53
  of primary tuberculosis of the mammary gland, 68
  of pulmonary abscess, 62
  of tuberculosis in children, 270
      of the lymph-glands of the neck, 26
  of typhoid fever, 155
Diazo reaction, Ehrlich's, 156
Diet in typhoid fever, 185
Diethyltoluthionin hydrochloride in the treatment of malaria, 196
Digestive ferments, action of, on toxins and antitoxins, 283
  powers and motility of infants' stomachs, 237
Dilatation of the colon, congenital idiopathic, 242
    treatment of, 243
Diphtheria, 151
  antitoxin, 151
  bacilli, branching, 301
  heart complications of, 155
  treatment of, 151
Diphtheritic paralysis, post-, 154
Disease, Addison's, in childhood, 274
  gastro-intestinal, effect of, on the blood in nurslings, 240

Disease of the heart, congenital, diagnosis of, 254
    hemorrhagic, of the new-born, 227
    Ménière's, treatment of, 405
    nasal, asthma and, 353
Diseases, the acute infectious, 133
    of children, 225
        constitutional, 269
    chronic, the blood in, 312
    of the circulatory system in children, 254
    of the ear, electro-massage in, 396
        pneumomassage in, 397
    of the new-born, 225
    of the urino-genital tract in children, 259
Disturbances of circulation, 313
Double empyema, 52
Drainage in empyema, 50
        Hutton's apparatus for, 51
Drum membrane, method of closing perforations of, 402
Dry air in the treatment of middle-ear suppuration, 403
Duct, Steno's, treatment of division of, 32
Duration of immunity, 289

EAR, auricle of, noma of, 389
        plastic operations on, 389
        tumors of, 392
    catheterization of, 399
    drum membrane of, methods of closing perforations of, 402
    electro-massage in diseases of, 396
    external, 385
        treatment of boils of, 385
    hysteria of the, 409
    menstruation from, 388
    middle, 393
        acute inflammation of, treatment of, 400
        anæsthesia in operations on, 394
        inflammation of, 395
            contagiousness of, 404
            treatment of, 395
        sclerosis of the, 393
            treatment of, 393
        suppuration of, bacteriology of, 404
            dry air in the treatment of, 403
        suppurative inflammation of, ophthalmoscopical examination in, 402
        tumors of the, 404
    pneumomassage in diseases of the, 397
Echinococcus, tænia, 341
Effect of atmospheric changes on the hearing in chronic aural catarrh, 397
Effusion, pericardial, surgical treatment of, 91
    pleural, in children, 253
        treatment of, 253
Egg membrane, use of, in preventing adhesions after operations upon the brain, 101
Ehrlich's diazo reaction, 156
Elastic fibres, formation of, 318
Electrolysis, cupric, in the treatment of ozæna, 347
Electrolytic treatment of inoperable tumors, 82
Electro-massage in diseases of the ear, 396
Embolism, thrombosis and, 313
Embryonal adenosarcoma of the kidney, 332
    tissue, implantation of, 330
Empyema, 49
    accessory sinus, fatal case of, 360
    anæsthesia in, 51
    diagnosis of, 49
    double, 52
    mortality of, 52
    treatment of, 49
Encephalitis, purulent, and cerebral abscess in a new-born infant, 230
Endocarditis of tonsillar origin, 256
Endothelioma, 336
Enucleation in the treatment of goitre, 21
Epidemic pneumonia, 198
Epididymitis following typhoid fever, 179
Epilepsy, division of the sympathetic nerves and resection of the sympathetic ganglia for, 122
    surgical treatment of, 119
Epistaxis, 29
    treatment of, 30
Epithelioma, use of caustics in the treatment of, 32
Epithelium, change of, into connective tissue, 318
Ether, injection of iodoform and, in the treatment of exophthalmic goitre, 18
Etiology of acute articular rheumatism, 139
    of congenital laryngeal stridor or infantile respiratory spasm, 378
    of convulsions in children, 267
    and diagnosis of cerebro-spinal fever, 207
    of pneumonia, 197
    of scarlet fever, 216
    of typhoid fever, 188
Examination of the blood in the infections, 138
    ophthalmoscopical, in suppurative inflammation of the middle ear, 402
Excision of tuberculous areas in the lung, 65
Exenteration of the tympanic cavity, 407
Exophthalmic goitre as a sequel to typhoid fever, 178
        treatment of, 17
Exostoses of the external auditory canal, 391
            treatment of, 391
Exploratory puncture of the chest, hemorrhage following, 253
External auditory canal, desquamation of, 388
            treatment of, 388
        exostosis of, 391
            treatment of, 391
        foreign bodies in the, 390
            treatment of, 390
        larvæ in the, 391

External auditory meatus, new local anæsthetic for operation upon, 383
treatment of boils in, 385
ear, treatment of boils of, 385
Extract of suprarenal capsule, use of, in the nose and throat, 375
Exudative lesions of tuberculosis, 304
Eye complications of acute infectious fevers, 222
Eyes, new-born's, value of Credé's solution in, 226

FACE, surgery of the, 24
False hearing, 394
Fatal cases of accessory sinus empyema, 360
Fatty degeneration, 321
liver, the condition of, in children, 248
Feces, nervous incontinence of, in children, 242
Feeding, artificial, of infants, 230
Fell-O'Dwyer apparatus, use of, in treating wounds of the thorax, 58
to prevent pulmonary collapse, 48
Ferments, digestive, action of toxins and antitoxins on, 283
Fever, cerebro-spinal. *See* Cerebro-spinal fever.
inanition, in the new-born, 228
treatment of, 228
scarlet. *See* Scarlet fever.
typhoid. *See* Typhoid fever.
Fevers, infectious, ocular complications of the, 174
Fibres, elastic, formation of, 318
Fibrinoid degeneration of connective tissue, 317
Filaria medinensis, 343
perstans, 343
Fistula following operation for abscess of the lung, treatment of, 64
Fœtus, transmission of agglutinating power of the blood from mother to, 161
Follicular tonsillitis in the new-born, 228
Food, time of resumption of solid, in typhoid fever, 185
Foods, infant, cereals in the preparation of, 231
influence of carbohydrates in, 231
Foreign bodies in the bronchi, 54
treatment of, 55
in the external auditory canal, 390
treatment of, 390
retained, in the brain, 106
treatment of, 107
Formalin, use of, in ozæna, 349
Formation of elastic fibres, 318
Free tumor metastasis in serous cavities, 331
Friction, thigh, in young infants, 263
treatment of, 263
Frontal sinus, 362
illumination of, 363
probing, 362
suppuration, operative treatment of, 364
external operation for, 365
Functions of the stapedius muscle, 385
Fungi, ray. *See* Ray fungi.

GALL-BLADDER, regeneration of the mucous membrane of the, 319
typhoid bacilli in the, 169
Ganglia, sympathetic, resection of, for epilepsy, 122
Gangrene foudroyante, new anaërobic bacillus of, 311
of the lung, 62
Gastrodiaphany of the infant's stomach, 240
Gastro-enteritis in children, 240
influence of, on the blood, 240
renal complications of, 240
General anæsthesia, Schleich's, 368
systemic infection of nasal origin, 345
Generalized paralysis occurring during the course of typhoid fever, 173
Germicidal powers of serum, 277
Gigli saw, uses of, 99
Gland, mammary, primary tuberculosis of the, 67
surgery of, 67
treatment of, 68
parotid, inflammation of, in pneumonia, 201
thyroid. *See* Thyroid gland.
surgery of the, 17
Glands, lymph. *See* Lymph-glands.
Glia tissue, degeneration micans of, 323
Glioma, 337
Goitre, anæsthetics in operations for, 21
exophthalmic, as a sequel to typhoid fever, 178
treatment of, 17
as a sequel to typhoid fever, 178
treatment of, 20
Gold-foil, use of, in preventing adhesions after operations upon the brain, 101
Gonococcic peritonitis in children, 246
Griffith's weight chart for infants, 235
Gunshot wounds of the thorax, 60
treatment of, 61

HÆMOCHROMATOSIS and bronzed diabetes, 323
Hæmoglobinuria and malaria, 195
treatment of, in malaria, 197
Handwriting in chorea, 266
Hay fever, treatment of, by protargol, 375
use of extract of suprarenal capsule in, 376
Head injuries, 102
treatment of, 103
neck, and chest, surgery of the, 17
Hearing in chronic aural catarrh, effect of atmospheric changes on, 397
false, 394
Heart, affections of, associated with night-terrors in children, 268
and bloodvessels, surgery of the pericardium, 84
complications of diphtheria, 155
diagnosis of congenital disease of the, 254

- Heart, infarction of the, 315
  - præcordial area of the, in children, 255
  - wounds of the, 84
    - treatment of, 85
- Hemorrhage following exploratory puncture of the chest in children, 253
  - intestinal, treatment of, in typhoid fever, 184
- Hemorrhagic disease of the new-born, 227
- Hepatic infarction, 314
  - veins, obliteration of, 315
- Histogenesis of the actinomycotic nodule, 304
- Hutton's apparatus for drainage in empyema, 51
- Hydrocephalus, hypoplasia of the adrenals and, 321
- Hydrotherapy in typhoid fever, 180
- Hypertrophy, congenital stenosis of the pylorus with, 238
    - treatment of, 239
- Hypoplasia of the adrenals and hydrocephalus, 321
- Hysteria of the ear, 409

- ICTERUS during influenza, 205
- Idiopathic dilatation of the colon, congenital, 242
    - treatment of, 243
- Illumination of the frontal sinus, 363
- Immunity and its production, 133
  - duration of, 289
  - infection, intoxication, and, 277
- Immunizing and protective powers of internal organs, 279
- Implantation of bone after trephining the skull, 97
  - of embryonal tissue, 330
- Inanition fever in the new-born, 228
    - treatment of, 228
- Incontinence, nervous, of feces in children, 242
  - of urine in children, 259
    - causes of, 260
    - treatment of, 261
- Indurative mediastinitis in children, 257
    - diagnosis of, 258
    - treatment of, 259
- Infancy, acute rheumatic polyarthritis in, 272
    - treatment of, 273
  - cholelithiasis in, 247
  - typhoid fever in childhood and, 274
    - prognosis of, 275
    - symptoms of, 274
    - treatment of, 275
- Infant, aneurism of the aorta in an, 259
  - foods, cereals in the preparation of, 231
    - influence of carbohydrates in, 231
    - milk whey for, 234
  - purulent encephalitis and cerebral abscess in a new-born, 230
- Infantile atrophy, 241
    - treatment of, 241
  - respiratory spasm, congenital laryngeal stridor or, 377
    - etiology and pathology of, 378
- Infantile scurvy, 273
- Infants. *See* also New-born, the.
  - arthritis in, following purulent ophthalmia, 226
  - artificial feeding of, 230
  - lowered temperature in congenitally weak, 225
  - method of obtaining the sputum of, 252
  - stomach, gastrodiaphany of the, 240
  - stomachs, digestive power and motility of, 237
  - thigh friction in young, 263
    - treatment of, 263
  - weight of, chart for, 235
- Infarction of the heart, 315
  - hepatic, 314
- Infarcts of the kidney, 316
- Infection, general systemic, of nasal origin, 345
  - intoxication, and immunity, 277
  - of nasal accessory sinuses, frequency of, 357
  - typhoid, changes in the nervous system produced by, 175
- Infections, examination of the blood in the, 138
- Infectious agents, transmission of, by insects, 136
  - diseases, including croupous pneumonia, 133
    - the acute, 133
  - fevers, ocular complications of the, 174
- Infective sinus thrombosis, 125
    - treatment of, 126
- Inflammation, acute, of the middle ear, treatment of, 400
  - of the middle ear, contagiousness of, 404
  - of the parotid gland in pneumonia, 201
  - and progressive changes, 316
  - suppurative, of the middle ear, ophthalmoscopical examination in, 402
- Influence on the blood of gastro-intestinal disease in nurslings, 240
  - of carbohydrates in infant foods, 231
  - of milk-supply upon spread of tuberculosis, 270
- Influenza, 203
  - complications of, 203, 205
  - lenticular rose spots in, 203
  - sequelæ of, 203, 206
  - sudoral form of, 203
  - varieties of, 203
- Influenzal splenopneumonia, 205
- Injection of iodoform and ether in treatment of exophthalmic goitre, 18
- Injections, intratympanic, 397
- Injuries of the head, 102
    - treatment of, 103
- Inoculation of tumors, successful, 328
- Insanity, post-operative, 114
  - surgical operations for, 116
- Insects, transmission of infectious agents by, 136
- Internal jugular vein, ligation of the, 33
  - organs, immunizing and protective powers of, 279

- Intestinal antiseptics, use of, in typhoid fever, 182
  - hemorrhage in typhoid fever, treatment of, 184
- Intestines, typhoid fever without lesions of, 162
- Intoxication and immunity, infection, 277
- Intratympanic injections, 397
- Intussusception, 243
  - treatment of, 243
- Iodoform and ether, injection of, in treatment of exophthalmic goitre, 18

- JUGULAR vein, internal ligation of, 33

- KERNIG'S sign in the diagnosis of cerebro-spinal fever, 209
  - in meningitis in children, 265
- Kidney, embryonal adenosarcoma of the, 332
  - infarcts of the, 316
- Kidneys, cystic degeneration of the, in the new-born, 230
- Koplik's sign in measles, 220

- LARVÆ in the external auditory canal, 391
- Laryngeal spasm in children, 249
  - stridor, congenital, 249, 377
    - etiology and pathology of, 378
- Laryngology. *See also* Throat.
  - and rhinology, 345
- Lenticular rose spots in influenza, 203
- Lesions, exudative, of tuberculosis, 304
- Leucoplakia, 42
  - treatment of, 43
- Ligation of the first part of the subclavian for subclavian aneurism, 96
  - of the internal jugular vein, 33
- Lingual psoriasis, 42
  - treatment of, 43
- Lip, carcinoma of the, 37
  - treatment of, 38
- Lips, surgery of the, tongue and mouth, 24
- Liver, fatty, the condition of, in children, 248
  - protective rôle of the, against the colon bacillus, 281
- Local anæsthesia, Schleich's, 370
  - anæsthetic, menthol, carbolic acid, and cocaine as a, 371
    - new, for operations on external auditory meatus, 388
- Location, influence of, on cancer, 326
- Lowered temperature in congenitally weak infants, 225
- Lumbar puncture for diagnosis in cerebro-spinal fever, 207
  - therapeutic value of, 209, 213
- Lumbrici causing purulent peritonitis in children, 247
- Lung, abscess of the, 62
  - diagnosis of, 62
  - operation for, 62
- Lung, abscess of the, treatment of fistula following, 64
    - tuberculous, operations for, 64
  - gangrene of the, 62
  - tuberculosis of, surgery of, 64
- Lymphaticus status in children, 250
- Lymph-glands, bacteria in normal peribronchial, 277
  - of the neck, diagnosis of, 26
    - treatment of, 27
    - tuberculosis of, 24

- MALARIA, 188
  - the blood in, 193
  - coexistence of typhoid and, 166, 194
  - etiology of, 188
  - hæmoglobinuria and, 195
  - nephritis caused by, 194
  - treatment of, 196
- Malarial nephritis, 194
- Mammary gland. *See also* Breast.
    - primary tuberculosis of the, 67
      - treatment of, 68
    - surgery of, 67
- Massage, electro-, in diseases of the ear, 396
  - pneumo-, 397
- Mastoid, the, 406
  - percussion of, 406
  - suppuration and abscess of the brain, 124
    - treatment of, 124
- Measles, 218
  - complications of, 221
  - diagnosis of, 219
  - etiology of, 218
  - recurrence in, 223
  - temperature-range in, 219
- Meatus, external auditory, new local anæsthetic for operations upon, 388
  - treatment of boils in, 385
- Mechanism of agglutination, 287
- Mediastinitis, indurative, in children, 257
  - diagnosis of, 258
  - treatment of, 259
- Membrane, drum, methods of closing perforations of, 402
- Ménière's disease, treatment of, 405
- Meningitis, the blood in, 312
  - in children, Kernig's sign in, 265
  - serous, complicating typhoid, 172
  - tuberculous, 123
- Meningo-typhus, 1[illegible]1
- Menstruation from the ear, 388
- Menthol, carbolic acid, and cocaine as a local anæsthetic, 371, 388, 394
- Metastases, free tumor, in serous cavities, 331
- Method of obtaining the sputum of infants, 252
  - of opening retropharyngeal abscess, 34
- Methods of closing perforations of the drum membrane, 402
  - of opening the cranial cavity, 97
- Methylene-blue in the treatment of malaria, 197

Microcephalus, craniotomy for, 112
Micro-organisms, pathogenic, 289
Middle ear, the, 393
    acute inflammation, treatment of, 400
    anæsthesia in operations on, 394
    inflammation of, 395
      contagiousness of, 404
      treatment of, 395
    sclerosis of the, 393
      treatment of, 393
    suppuration of, 400
      bacteriology of, 404
      dry air in the treatment of, 403
      ophthalmoscopic examination in, 402
      treatment of, 400
    tumors of the, 404
Milk, modification of, 234
  separation of bacteria in, 231
  -supply, influence of, upon tuberculosis, 270
  variation of proteids in, 230
  -whey in infant-feeding, 234
Mode of action of antitoxins, 287
Modification of milk, 234
Modified tubercle bacilli, 298
Mortality of empyema, 52
Motility of infants' stomachs, digestive power and, 237
Mouth, surgery of the, 24
Mucous membrane of the gall and urinary bladders, regeneration of, 319
Muscle, stapedius, functions of, 385
Myringitis sicca, 395
    treatment of, 395

NÆVÆ, 46
    treatment of, 46
Nana, tænia, 342
Nasal accessory sinuses, 357
      frequency of infection, 357
  disease, asthma and, 353
  origin, general systemic infection of, 345
  septum, treatment of deflections of, 350
Neck and chest, surgery of the head, 17
  division of the vagus in the, 35
  surgery of the, 24
  tuberculosis of the lymph-glands of the, 24
      diagnosis of, 26
      treatment of, 27
Nematelminthes, 342
Nephritis, malarial, 194
Nerve, pneumogastric, division of, in the neck, 35
Nerves, peripheral, regeneration of, 319
  sympathetic, division of, for epilepsy, 122
Nervous incontinence of feces in children, 242
  system, action of the typhoid bacillus upon, 171
Nervous system, affections of, in children, 264
    changes in, produced by typhoid infection, 175
Neuralgia, trigeminal, operations for, 127
New acid-proof bacilli and studies in this group, 303
  anaërobic bacillus of gangrene foudroyante, 311
  -born, cystic degeneration of the kidneys in the, 230
    diseases of the, 225
    follicular tonsillitis in the, 228
    hemorrhagic disease of the, 227
    inanition fever in the, 228
      treatment of, 228
    value of Credé's solution in eyes of, 226
Night-terrors in children, 268
Nodule, actinomycotic, histogenesis of, 304
Noma of the auricle of the ear, 389
Nomenclature, classification and, of the ray fungi, 296
Nose and throat, affections of, use of certain anæsthetics in, 368
    local anæsthesia in, 371
    use of certain agents in, 372
    use of extract of suprarenal capsule in, 375
    use of protargol in, 372
    use of Schleich's general anæsthesia in surgery of, 368
        local anæsthesia, 370

OBLITERATION of hepatic veins, 315
  Occlusion, congenital, of the stomach, 230
Occurrence of carcinoma in the lower animals, 331
Ocular complications of the infectious fevers, 174
Œsophagus, stricture of the, following typhoid fever, 178
    in children, 236
      treatment of, 236
Œstrus hominis, 343
Oöphorectomy for inoperable or recurrent cancer, 82
Operation for carcinoma of the breast, 71
    of the tongue, 36
  for cleft palate, 44
  in exostosis of the external auditory canal, 391
  external, for frontal sinus suppuration, 365
  for foreign bodies in the bronchi, 55
  for pulmonary abscess, 62
  for sinus thrombosis, 407
  Tagliacotian, of rhinoplasty, 28
  for tongue-tie, 44
Operations about the chest, use of Fell-O'Dwyer apparatus in, 48
  on the brain, adhesions after, 100
      prevention of, 101
  for carcinoma of the lip, 39
  in empyema, 49

Operations in empyema, results of, 49
  on external auditory meatus, new local anæsthetic for, 388
  for foreign bodies in the external auditory canal, 390
  for goitre, anæsthetics in, 21
  insanity following, 114
  on the middle ear, anæsthesia in, 394
  plastic, on the auricle of the ear, 389
  surgical, about the chest, 47
    for insanity, 116
  on the sympathetic in the treatment of exophthalmic goitre, 19
  for treatment of deflection of the nasal septum, 351
  for trigeminal neuralgia, 127
  for tuberculous lung abscess, 64
Operative treatment of frontal sinus suppuration, 364
Ophthalmia neonatorum, treatment of, 226
  purulent, arthritis in infants following, 226
Ophthalmoscopic examination in suppurative inflammation of the middle ear, 402
Orchitis following typhoid fever, 179
Organs, internal, immunizing and protective powers of, 279
  respiratory, affections of, in children, 251
    coin test as an aid in diagnosis of, 251
Origin, arsenical, of carcinoma, 330
  tonsillar, of endocarditis, 256
Osteoplastic resection of the skull, 99
Otitis externa diffusa, 388
    treatment of, 388
  media suppurativa, 403
    ophthalmoscopic examination in, 402
    treatment of, 400, 403
Otology, 385
  physiology of, 385
Oxyuris vermicularis, 342
Ozæna, 347
  treatment of, 347

PAIN, anginoid, following influenza, 205
Palate, cleft, 44
  operation for, 44
Pancreatic autodigestion, 322
Pane's serum, use of, in pneumonia, 201
Paralysis, generalized, during the course of typhoid fever, 173
  post-diphtheritic, 154
  spastic spinal, following influenza, 206
Parasitic worms and other parasites, 340
Parotid gland, inflammation of, in pneumonia, 201
Partial thyroidectomy in the treatment of exophthalmic goitre, 18
Pathogenic blastomycetes, 292
  micro-organisms, 289
  sporothrix, 289
Pathology, 277
  of congenital laryngeal stridor, or infantile respiratory spasm, 378
Pathology of scarlet fever, 217
Pemphigus neonatorum, 229
    treatment of, 229
Penetrating wounds of the thorax, 57
    treatment of, 57
Pentastomum constrictum, 343
Percussion of the mastoid process, 406
Perforation of the bowel in typhoid fever, 176
    diagnosis of, 176
Perforations of the drum membrane, method of closing, 402
Peribronchial lymph-glands, bacteria in normal, 277
Pericardial effusion, surgical treatment of, 91
Pericarditis in children, 256
    diagnosis of, 257
    prognosis of, 257
    treatment of, 257
  suppurative, 92
Pericardium, heart, and bloodvessels, surgery of the, 84
  suture of the, 88
Periostitis following typhoid fever, 180
Peripheral nerves, regeneration of, 319
Peritonitis in children, acute, 245
    gonococcic, 246
    purulent, caused by lumbrici, 247
Phagocytosis, 284
  action of tuberculin on, 304
Phenomena, sensory, in chorea, 266
Phlegmon ligneux du cou, 35
    symptoms of, 35
Physiology of otology, 385
Piorkowski's test in typhoid fever, 156
Plantar reflex as an aid in diagnosis, 264
Plasma cell, 316
Plastic operations on the auricle of the ear, 389
Pleural effusion in children, 253
    treatment of, 253
Pneumatic cabinet in the treatment of catarrhal deafness, 396
Pneumogastric nerve, division of, in the neck, 35
Pneumomassage, 397
Pneumonia, 197
  the blood in, 312
  central, diagnosis of, 200
  complications of, 201
  epidemic, 198
  etiology of, 197
  silent, 201
  treatment of, 201
Pneumothorax, 53
  diagnosis of, 53
  in young children, 254
Pneumotomy for pulmonary tuberculosis, 65
Post-diphtheritic paralysis, 154
  -operative insanity, 114
Polyarthritis, acute rheumatic, in infancy, 272
    diagnosis of, 273
Præcordial area in children, 255
Prevention of adhesions after operations upon the brain, 101

Primary tuberculosis of the mammary gland, 67
Probing the frontal sinus, 362
Production of immunity, 133
Prognosis of pericarditis in children, 257
    of typhoid fever in infancy and childhood, 275
Progressive changes, 316
Protargol, treatment of hay fever by, 375
    use of, in the nose and throat, 372
Protective powers, immunizing and, of internal organs, 279
    rôle of the liver against the colon bacillus, 281
Proteids in milk, variation of, 230
Pseudotuberculosis, 306
Psoriasis, lingual, 42
        treatment of, 43
Pulmonary abscess, 62
        diagnosis of, 62
        operation for, 62
        treatment of fistulæ following, 64
    collapse, Fell-O'Dwyer apparatus for the prevention of, 48
    gangrene, 62
    tuberculosis, surgery of, 64
Puncture, exploratory, of the chest in children, hemorrhage following, 253
Puncture, lumbar, for diagnosis in cerebrospinal fever, 207
Purulent encephalitis and cerebral abscess in a new-born infant, 230
    ophthalmia, arthritis in infants following, 226
    peritonitis in children due to lumbrici, 247
Pylorus, congenital stenosis of, with hypertrophy, 238
        treatment of, 239
Pyopneumothorax of necessity, 53

QUININE hydrochlorate in the treatment of malaria, 196

RANULA, 42
    treatment of, 42
Rashes, anomalous, in typhoid fever, 165
Ray fungi, classification and nomenclature of, 296
        relation of, to certain bacteria, especially the germ of tuberculosis, 296
Reaction, Ehrlich's diazo, 156
    the Widal, 157
Recurrence in measles, 223
Recurrent cancer, oöphorectomy for, 82
Reflex, plantar, as an aid in diagnosis, 264
Regeneration of antitoxins, 289
    of the mucous membrane of the urinary and gall-bladders, 319
    of peripheral nerves, 319
Renal typhoid, 176
    complications of gastro-enteritis in children, 240
Repeated attacks in typhoid fever, 187
Resection of rib in the treatment of pulmonary tuberculosis, 66
    of ribs in empyema, 50
    of the skull, osteoplastic, 99
    of the sympathetic ganglia for epilepsy, 122
Respiratory organs, affections of, in children, 251
        coin test as an aid in diagnosis of, 251
    passages, affections of the upper, in children, 249
    spasm, infantile. *See* Infantile respiratory spasm.
Retained foreign bodies in the brain, 106
        treatment of, 107
Retention of urine in children due to spasm of the sphincter vesicæ, 261
Retrogressive changes, 321
Retropharyngeal abscess, 33
        treatment of, 33
Rheumatic polyarthritis, acute, in infancy, 272
        diagnosis of, 273
Rheumatism, acute articular, 139
    bacteriology of, 142
    etiology of, 139
    symptoms of, 141
    treatment of, 150
Rhinology. *See also* Nose.
    laryngology and, 345
Rhinoplasty, 28
Rib resection in the treatment of pulmonary tuberculosis, 66
Ribs, resection of, in empyema, 50
Rose spots, lenticular, in influenza, 203
Roseola, typhoid bacilli in, 165
Rubber tissue, use of, in preventing adhesions after operations upon the brain, 101
Rumination in children, 239
        treatment of, 239

SARCOMA of the thyroid gland, 23
        treatment of, 24
Saw, Gigli, uses of, 99
Scarlet fever, 216
        etiology of, 216
        pathology of, 217
Schleich's general anæsthesia, 368
    local anæsthesia, 370
Sclerosis of the middle ear, 393
        treatment of, 393
Scurvy, infantile, 273
Sea-bathing, effect of, on aural affections, 398
    climate, effect of, on aural affections, 398
Secondary thyroiditis, 22
Sensory phenomena in chorea, 266
Separation of bacteria in milk, 231
Sepsis, the blood in, 312
Septum, nasal, treatment of deflections of the, 350
Sequelæ of influenza, 203
    of typhoid fever, 178

Serous cavities, free tumor metastasis in, 331
  meningitis complicating typhoid, 172
  pleuritis, induction of, in treatment of pulmonary tuberculosis, 66
Serum, agglutination of, 286
    mechanism of, 287
  antistreptococcic, in the treatment of cerebro-spinal fever, 215
    use of, in infective sinus thrombosis, 126
  germicidal powers of, 277
  Pane's, use of, in pneumonia, 201
  treatment of ozæna, 348
Sign, Bolognini's, of measles, 219
  Kernig's, in the diagnosis of cerebro-spinal fever, 209
    in meningitis in children, 265
  Koplik's, in measles, 220
Silent pneumonia, 201
Sinus, accessory, fatal case of empyema of, 360
  frontal, 362
    illumination of, 363
    probing, 362
    suppuration, external operation for, 365
      operative treatment of, 364
  nasal, accessory, 357
      frequency of infection of, 357
  thrombosis, 407
    infective, 125
      treatment of, 126
    operation for, 407
Skull, osteoplastic resection of, 99
  surgery of the, 97
Solution, Credé's, value of, in new-born children's eyes, 226
Spasm, infantile respiratory, 377, 378
  laryngeal, in children, 249
  of the sphincter vesicæ, retention of urine in children due to, 261
Spastic spinal paralysis following influenza, 206
Speculum, Sutherland's, for operating on tongue tie, 43
Sphincter vesicæ, retention of urine in children due to spasm of, 261
Spinal paralysis, spastic, following influenza, 206
Spine, typhoid, 179
Splenopneumonia, influenzal, 205
Sporothrix, a pathogenic, 289
Sputum of infants, method of obtaining, 252
Stain, new, for tubercle bacilli, 306
Stapedius muscle, functions of, 385
Statistics of cancer and its supposed increase, 326
Status lymphaticus in children, 250
Steno's duct, division of, treatment of, 32
Stenosis of the pylorus, congenital, with hypertrophy, 238
      treatment of, 239
Stomach, congenital occlusion of, 230
  infant's, gastrodiaphany of, 240
Stomachs, infants', digestive power and motility of, 237
Streptococci and their toxins, action of, on the organs, 311
Stricture of the œsophagus following typhoid fever, 178
    in children, 236
      treatment of, 236
Stridor, congenital laryngeal, 249, 377
  etiology and pathology of, 378
Subclavian aneurism, 96
    ligation of the first part of the subclavian for, 96
Successful inoculation of tumors, 328
Sudoral form of influenza, 203
  typhoid, 167
Suppuration, frontal sinus, operative treatment of, 364, 365
  mastoid, and abscess of the brain, 124
      treatment of, 124
  of the middle ear, bacteriology of, 404
      treatment of, 400, 403
Suppurative inflammation of the middle ear, ophthalmoscopic examination in, 402
  pericarditis, 92
Suprarenal capsule, use of extract of, in the nose and throat, 375
Surgery of the face, neck, lips, tongue, and mouth, 24
  of the head, neck, and chest, 17
  of the pericardium, heart, and blood-vessels, 84
  of pulmonary tuberculosis, 64
  of the skull and brain, 97
  of the thyroid gland, 17
Surgical operations about the chest, 47
    for insanity, 116
  treatment of epilepsy, 119
    of pericardial effusion, 91
Sutherland's speculum for operating upon tongue-tie, 43
Suture of the pericardium, 88
Sympathectomy in the treatment of exophthalmic goitre, 19
Sympathetic ganglia, resection of, for epilepsy, 122
  nerves, division of, for epilepsy, 122
  operations upon the, for exophthalmic goitre, 19
Symptomatology of typhoid fever, 163
Symptoms of acute articular rheumatism, 141
  and diagnosis of tuberculosis in children, 270
  of primary tuberculosis of the mammary gland, 68
  of typhoid fever in childhood and infancy, 274
System, circulatory, diseases of, in children, 254
  nervous, action of the typhoid bacillus upon, 171
    changes produced by typhoid infection in the, 175
Systemic infection, general, of nasal origin, 345

TÆNIA echinococcus, 341
  nana, 342
  solium, 341
Temperature, lowered, in congenitally weak infants, 225
  -range in measles, 219
    in pneumonia, 199
Test, coin, as an aid in diagnosis of respiratory affections in children, 251
  Piorkowski's, in typhoid fever, 156
Tetanus, bacillus of, 311
Therapeutic agents, use of certain, in the nose and throat, 372
Thigh friction in young infants, 263
    treatment of, 263
Thorax, gunshot wounds of the, 60
    treatment of, 61
  penetrating wounds of the, 57
    treatment of, 57
Throat, affections of the nose and, use of certain anæsthetics in, 368
  nose and, local anæsthesia in, 371
    use of certain therapeutic agents in the, 372
      extract of suprarenal capsule in, 375
      protargol in, 372
      Schleich's general anæsthesia in surgery of, 368
        local anæsthesia, 370
Thrombosis and embolism, 313
  infective sinus, 125
    treatment of, 126
  sinus, 407
    operation for, 407
Thyroid gland, carcinoma of the, 23
    treatment of, 24
  sarcoma of the, 23
    treatment of, 24
  surgery of the, 17
Thyroiditis, secondary, 22
Thyroidectomy, partial, in the treatment of exophthalmic goitre, 18
  in the treatment of goitre, 20
Tongue, carcinoma of the, 36
    treatment of, 36
  surgery of the, 24
  -tie, 43
    treatment of, 44
Tonsillar origin, endocarditis of, 256
Tonsillitis, follicular, in the new-born, 228
Toxins, action of streptococci and their, on organs of the body, 311
  and antitoxins, action of digestive ferments on, 283
Tracheocele in children, 249
Transmission of agglutinating power of the blood from mother to fœtus, 161
  of infectious agents by insects, 136
Treatment of abscess of the brain and mastoid suppuration, 124
  of acute articular rheumatism, 150
    inflammation of the middle ear, 400
  of aneurism of the aorta, 92
  of boils of external ear, 385
  of bronchopneumonia in children, 252
Treatment of carcinoma of the breast, 71
    of the tongue, 36
  of catarrhal deafness, the pneumatic cabinet in, 396
  of cerebro-spinal fever, 213
  of chorea, 267
  of congenital idiopathic dilatation of the colon, 243
    stenosis of the pylorus, 239
  of cystitis in children, 262
  of cysts of the breast, 70
  of deaf-mutism, 410
  of deflection of the nasal septum, 350
  of diphtheria, 151
  of division of Steno's duct, 32
  electrolytic, of inoperable tumors, 82
  of empyema, 49
  of epistaxis, 30
  of epithelioma, use of caustics in, 32
  of exophthalmic goitre, 17
  of exostoses of the external auditory canal, 391
  of fistula following operation for pulmonary abscess, 64
  of foreign bodies in the bronchi, 55
      in the external auditory canal, 390
  of gunshot wounds of the thorax, 61
  of hay fever by protargol, 375
  of head injuries, 103
  of inanition fever in the new-born, 228
  of incontinence of urine in children, 261
  of indurative mediastinitis in children, 259
  of infantile atrophy, 241
  of infective sinus thrombosis, 126
  of inoperable cases of carcinoma of the breast, 79
  of intestinal hemorrhage in typhoid fever, 184
  of intussusception, 243
  of leucoplakia or lingual psoriasis, 43
  of malaria, 196
    of hæmoglobinuria in, 197
  of malignant disease of the thyroid, 23, 24
  of Ménière's disease, 405
  of myringitis sicca, 395
  of nævæ or birth-marks, 46
  of nasal and pharyngeal affections, 406
  operative, of frontal sinus suppuration, 364
  of ophthalmia neonatorum, 226
  of otitis externa diffusa or desquamation of the external auditory canal, 388
    media suppurativa, 400
  of ozæna, 347
  of pemphigus neonatorum, 229
  of penetrating wounds of the thorax, 57
  of pericarditis in children, 257
  of pleural effusion in children, 253
  of pneumonia, 201
  of primary tuberculosis of the mammary gland, 68

Treatment of pulmonary abscess, 62
    of purulent peritonitis in children, due to lumbrici, 247
    of ranula, 42
    of renal complications of gastro-enteritis in children, 241
    of retained foreign bodies in the brain, 107
    of retropharyngeal abscess, 33
    of rumination in children, 239
    of sclerosis of the middle ear, 393
    of stricture of the œsophagus in children, 236
    of suppuration of the middle ear, 400, 403
    surgical, of pericardial effusion, 91
        of epilepsy, 119
    of thigh friction in young infants, 263
    of tongue-tie, 44
    of tuberculosis of the lymph-glands of the neck, 27
    of tuberculous adenitis, 272
    of tumors of the walls of the chest, 47
    of typhoid fever, 180
        in infancy and childhood, 275
    Woodbridge, in typhoid fever, 183
    of wounds of the heart, 85
Trematoda, 340
Trephining, 97
Trichina spiralis, 342
Tricocephalus dispar, 342
Trigeminal neuralgia, operations for, 127
Tubercle, action of tuberculin on, 304
    bacilli, a new stain for, 306
        modified, 298
Tubercular cystitis in children, 262
Tuberculin, action of, 304
Tuberculosis in children, 259
        symptoms and diagnosis of, 270
    exudative lesions of, 304
    germ of, relation of ray fungi to, 296
    influence of milk-supply upon spread of, 270
    of the lymph-glands of the neck, 24
        diagnosis of, 26
        treatment of, 27
    primary, of the mammary gland, 67
    pulmonary, surgery of, 64
Tuberculous adenitis, 271
        treatment of, 272
    lung abscess, operations for, 64
    meningitis, 123
Tumor metastases, free, in serous cavities, 331
Tumors, 326
    of the auricle of the ear, 392
    electrolytic treatment of inoperable, 82
    of extraordinary size, 331
    of the middle ear, 404
    of the walls of the chest, 47
        treatment of, 47
    successful inoculation of, 328
Tympanic cavity, exenteration of the, 407
Typhoid antitoxin, 186
    bacilli in the gall-bladder, 169
        in the roseola, 165
        in the urine, 167
Typhoid bacillus, action of, upon the nervous system, 171
    fever and malaria, simultaneous existence of, 166, 194
        anomalous rashes in, 165
        diagnosis of, 155
            Ehrlich's diazo reaction in, 156
            Piorkowski's test in, 156
            Widal's reaction in, 157
        diet in, 185
        generalized paralysis occurring during the course of, 173
        in infancy and childhood, 274
            prognosis of, 275
            symptoms of, 274
            treatment of, 275
        ocular complications in, 174
        perforation of the bowel in, 176
            diagnosis of, 176
        renal, 176
        repeated attacks in, 187
        sequelæ of, 178
        serous meningitis complicating, 172
        sudoral, 167
        symptomatology of, 163
        treatment of, 180
            intestinal hemorrhage, 184
        without intestinal lesions, 162
    infection, changes produced in the nervous system by, 175
    spine, 179

UNGUENTUM Credé, 214
        in the treatment of cerebro-spinal fever, 214
Urinary bladder, regeneration of the mucous membrane of, 319
Urine, incontinence of, in children, 259
            causes of, 260
            treatment of, 261
    retention of, in children, due to spasm of the sphincter vesicæ, 261
    typhoid bacilli in the, 167
Urino-genital tract in children, diseases of the, 259

VAGUS, division of, in the neck, 35
Variation of proteids in milk, 230
Varieties of influenza, 203
Vein, internal jugular, ligation of the, 33
Veins, hepatic, obliteration of, 315

WEIGHT of infants, 235
        chart for infants, 235
Whey, milk-, in infant-feeding, 234
Widal reaction, the, 157
Woodbridge treatment in typhoid fever, 183
Worms, parasitic, 340
Wounds, gunshot, of the thorax, 60
            treatment of, 61
    of the heart, 84
        treatment of, 85
    penetrating, of the thorax, 57
            treatment of, 57

SERIAL

P
Med
P
1900
Mar.

GERSTS

Progressive medicine